

## VPDES PERMIT FACT SHEET

This document gives pertinent information concerning the reissuance of the VPDES permit listed below. This permit is being processed as a Major, Municipal permit. The effluent limitations contained in this permit will maintain the Water Quality Standards (WQS) of 9VAC25-260. The proposed discharge will result from the operation of a municipal sewage treatment plant (SIC Code: 4952 - Sewerage Systems). This permit action consists of reissuing the permit with revisions to the permit, as needed, due to changes in applicable laws, guidance, and available technical information.

1. Facility Name and Address:  
Broadway Regional WWTF  
116 Broadway Avenue  
Broadway, VA 22815  
Location: 15524 New Market Road, Timberville
2. Permit No. VA0090263; Expiration Date: October 31, 2014
3. Owner: Town of Broadway  
Contact Name: John Coffman  
Title: Wastewater Superintendent  
Telephone No: (540) 896-7351  
Email: jecoffman@town.broadway.va.us
4. Description of Treatment Works Treating Domestic Sewage:  
Total Number of Outfalls: 1

The WWTF currently receives municipal wastewater from the Town of Broadway, the Town of New Market, and the Town of Timberville, as well as poultry processing wastewater and domestic sewage from Pilgrim's Pride Corporation and Cargill Meat Solutions.

Treatment consists of 5-stage BNR with denitrification filters and UV disinfection. Treated effluent is either spray irrigated to agricultural fields or discharged to the North Fork Shenandoah River.

Average Discharge Flow (Jan 2012 – Dec 2013) = 1.70 MGD  
Design Average Flow = 2.923 MGD

5. Application Complete Date: May 1, 2014

Permit Writer: Dawn Jeffries	Date: July 15, 2014
Reviewed By: Bev Carver	Date: July 28, 2014

Public Comment Period: September 29, 2014 to October 29, 2014

6. Receiving Stream Name: North Fork Shenandoah River  
River Mile: 85.53  
Use Impairment: Yes  
Special Standards: pH  
Tidal Waters: No  
Watershed Name: VAN – B45R North Fork Shenandoah River/Holmans Creek  
Basin: Potomac; Subbasin: Shenandoah  
Section: 6; Class: IV

## Fact Sheet – VPDES Permit No. VA0090263 – Broadway Regional WWTF

7. Operator License Requirements per 9VAC25-31-200.C: Class I
8. Reliability Class per 9VAC25-790: Class I for collection system (assigned 8/9/99)  
Class II for treatment and storage facilities (assigned 8/19/99)  
Class II for irrigation facilities (assigned 10/7/99)
9. Permit Characterization:  
☐ Private ☐ Federal ☐ State ☒ POTW ☐ PVOTW  
☐ Possible Interstate Effect ☐ Interim Limits in Other Document (attach copy of CSO)
10. Discharge Location Description and Receiving Waters Information: Appendix A
11. Antidegradation (AD) Review & Comments per 9VAC25-260-30:  
Tier Designation: Tier 1  

The State Water Control Board's WQS include an AD policy. All state surface waters are provided one of three levels of AD protection. For Tier 1 or existing use protection, existing uses of the water body and the water quality to protect these uses must be maintained. Tier 2 waters have water quality that is better than the WQS. Significant lowering of the water quality of Tier 2 waters is not allowed without an evaluation of the economic and social impacts. Tier 3 waters are exceptional waters and are so designated by regulatory amendment. The AD policy prohibits new or expanded discharges into exceptional waters.

The antidegradation review begins with a Tier determination. The North Fork Shenandoah River in the immediate vicinity and below Outfall 003 is determined to be a Tier 1 water because it is listed as impaired for aquatic life use (benthics). Antidegradation baselines are not calculated for Tier 1 waters.
12. Site Inspection: Performed by Dawn Jeffries on October 11, 2013
13. Effluent Screening and Effluent Limitations: Appendix B
14. Effluent toxicity testing requirements included per 9VAC25-31-220.D: ☒ Yes ☐ No  
If "No," check one:  
☐ Municipal: This facility does not have a design flow  $\geq 1.0$  MGD, has no Significant Industrial Users (SIUs) or Categorical Industrial Users (CIUs), and is not deemed to have the potential to cause or contribute to instream toxicity.  
☐ Industrial: This facility's SIC Code(s) and activities contributing wastewater do not fall within the categories for which aquatic toxicity monitoring is required, the facility does not have an IWC  $\geq 33\%$ , and the discharge is not deemed to have the potential to cause or contribute to instream toxicity.
15. Sewage sludge utilization and disposal options include the following:
  - land application of biosolids by Agri-Sludge, Inc. under the authorization of VPA Permit No. VPA01584
16. Bases for Special Conditions: Appendix C
17. Material Storage per 9VAC25-31-280.B.2: This permit requires that the facility's O&M Manual include information to address the management of wastes, fluids, and pollutants which may be present at the facility, to avoid unauthorized discharge of such materials.

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18. Antibacksliding Review per 9VAC25-31-220.L: This permit complies with the antibacksliding provisions of the VPDES Permit Regulation.
19. Impaired Use Status Evaluation per 9VAC25-31-220.D: The North Fork Shenandoah River in the immediate vicinity of the discharge is listed as impaired for aquatic life use (benthic) and bacteria. The facility was included in the North Fork Shenandoah River Bacteria TMDL (represented by *E. coli*) which was approved September 9, 2006. A TMDL addressing the bacteria impairment includes the following waste load allocation (WLA) for this discharge:
- E. coli*:  $3.35 \times 10^{12}$  cfu/yr (based on a design flow of 1.923 MGD and a concentration of 126 cfu/100 mL)
- A TMDL addressing the benthic impairment has not been prepared. The permit contains a re-opener condition that may allow the permit limits to be modified, in compliance with section 303(d)(4) of the Act once a TMDL is approved.
20. Regulation of Users per 9VAC25-31-280.B.9: N/A – This facility is owned by a municipality.
21. Storm Water Management per 9VAC25-31-120: Application Required? ☒ Yes ☐ No  
The facility has submitted No Exposure Certification, which is approved with the reissuance of this permit.
22. Compliance Schedule per 9VAC25-31-250: There are no compliance schedules included in the reissued permit.
23. Variances/Alternative Limits or Conditions per 9VAC25-31-280.B, 100.K and 100.N: None.
24. Financial Assurance Applicability per 9VAC25: N/A – This facility is owned by a municipality.
25. Virginia Environmental Excellence Program (VEEP) Evaluation per § 10.1-1187.1-7: At the time of this reissuance, is this facility considered by DEQ to be a participant in the Virginia Environmental Excellence Program in good standing at either the Exemplary Environmental Enterprise (E3) level or the Extraordinary Environmental Enterprise (E4) level? ☐ Yes ☒ No
26. Nutrient Trading Regulation per 9VAC25-820: See Appendix B  
General Permit Required: ☒ Yes ☐ No
27. Nutrient monitoring included per Guidance Memorandum 14-2011: ☐ Yes ☒ No
- If “No,” check one:
- ☒ This facility is a Significant Discharger as defined in the Nutrient Trading Watershed General Permit (WGP) Regulation 9VAC25-820 and is actively monitoring and reporting under the WGP. This permit does not include any outfalls that discharge solely stormwater exposed to industrial activity.
- ☐ This facility is a Nonsignificant Discharger (all facilities not classified as Significant Dischargers as defined in the Nutrient Trading Watershed General Permit Regulation 9VAC25-820) that has previously demonstrated through monitoring or characterizing the nature of the discharge that they are not a source of a net TP or TN load. This permit does not include any outfalls that discharge solely stormwater exposed to industrial activity.
28. Threatened and Endangered (T&E) Species Screening per 9VAC25-260-20 B.8: Because this is not an issuance or reissuance that allows increased discharge flows, T&E screening is not automatically required. However, in accordance with the VPDES Memorandum of Understanding, T&E screening was coordinated on September 5, 2013 through DCR based upon request. Comments that no adverse impacts are anticipated from this discharge were received from DCR on October 2, 2013.

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29. Public Notice Information per 9VAC25-31-280.B: All pertinent information is on file, and may be inspected and copied by contacting Dawn Jeffries at: DEQ-Valley Regional Office, P.O. Box 3000, Harrisonburg, Virginia 22801, Telephone No. (540) 574-7850, dawn.jeffries@deq.virginia.gov.

Persons may comment in writing or by email to the DEQ on the proposed permit action, and may request a public hearing, during the comment period. Comments shall include the name, address, and telephone number of the writer, and shall contain a complete, concise statement of the factual basis for comments. Only those comments received within this period will be considered. The DEQ may decide to hold a public hearing if public response is significant. Requests for public hearings shall state the reason why a hearing is requested, the nature of the issues proposed to be raised in the public hearing and a brief explanation of how the requester's interests would be directly and adversely affected by the proposed permit action. Following the comment period, the Board will make a determination regarding the proposed permit action. This determination will become effective, unless the DEQ grants a public hearing. Due notice of any public hearing will be given.

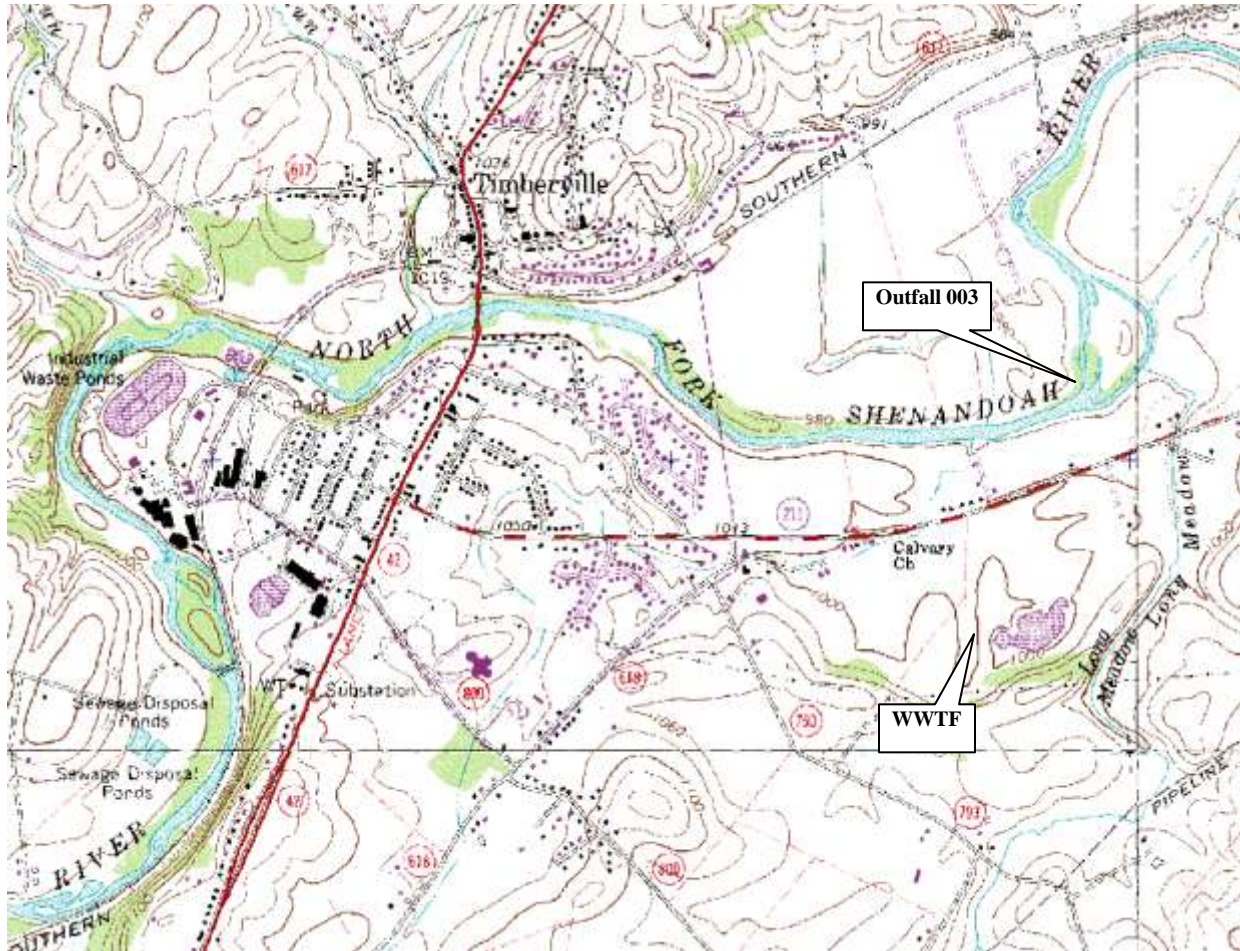
30. Historical Record:

Original VPDES permit issued	10/15/99
CTO for treatment facilities and storage facilities (Phase I) issued	8/29/00
CTO for the irrigation facilities etc. (Phase II & III) issued	3/29/01
Facility began land application	4/4/01
Facility began discharging	4/11/01
Permit modified to add an outfall, clarify irrigation rates and timing, revise sample types, and clarify other monitoring requirements	4/7/03
Outfall 002 and diffuser installed	Sept 2004
Automatic transfer of permit from SIL Clean Water LLC to Town of Broadway	11/21/07
Permit modified to change the facility owner, add an expansion flow tier, add pretreatment program language, update the nutrient requirements, reduce the ground water monitoring frequency, and remove all references to Outfall 001.	6/6/08
Permit modified to change to change the minimum freeboard requirement in cell #1 from 24 inches to 18 inches.	9/23/08
Permit modified to remove the minimum freeboard requirements for cell #1, cell #2, and the storage lagoon, and to require that the management of adequate freeboard be addressed in the facility's O&M Manual	1/14/09
Issuance of CTO for upgraded & expanded facility	11/22/10
2007 Consent Decree completed and terminated	7/5/12
Outfall 003 use began	12/1/10

**APPENDIX A**

**DISCHARGE LOCATION AND RECEIVING WATERS INFORMATION**

The WWTF discharges to the North Fork Shenandoah River in Rockingham County from Outfall 003. The locations of the WWTF and Outfall 003 are shown on the topographic map below.



## Fact Sheet – VPDES Permit No. VA0090263 – Broadway Regional WWTF

### PLANNING INFORMATION

Relevant points of interest within the watershed and in the vicinity of the discharge are shown on the Water Quality Assessments Review table below.

WATER QUALITY ASSESSMENTS REVIEW						
POTOMAC-SHENANDOAH RIVER BASIN						
10/7/2013						
<b>IMPAIRED SEGMENTS</b>						
<u>SEGMENT ID</u>	<u>STREAM</u>	<u>SEGMENT START</u>	<u>SEGMENT END</u>	<u>SEGMENT LENGTH</u>	<u>PARAMETER</u>	
B45R-01-BAC	Long Meadow Run	8.53	0.00	8.53	E-coli	
B45R-01-BEN	Long Meadow Run	8.53	0.00	8.53	Benthic	
B45R-04-BAC	North Fork Shenandoah River	92.61	60.75	31.86	Fecal Coliform	
B45R-05-BEN	North Fork Shenandoah River	87.92	76.11	11.81	Benthic	
B46R-01-BAC	Linville Creek	13.49	0.00	13.49	E-coli, Fecal Coliform	
B46R-01-BEN	Linville Creek	13.49	0.00	13.49	Benthic	
<b>PERMITS</b>						
<u>PERMIT</u>	<u>FACILITY</u>	<u>STREAM</u>	<u>RIVER MILE</u>	<u>LAT</u>	<u>LONG</u>	<u>WBID</u>
VA0002623	Food Processors Water Coop	N.F. Shenandoah River	88.82	383739	784659	VAV-B45R
<b>VA0090263</b>	<b>Town of Broadway Region</b>	<b>N.F. Shenandoah River</b>	<b>85.53</b>	<b>383808</b>	<b>784506</b>	<b>VAV-B45R</b>
<b>MONITORING STATIONS</b>						
<u>STREAM</u>	<u>NAME</u>	<u>RIVER MILE</u>	<u>RECORD</u>	<u>LAT</u>	<u>LONG</u>	
Linville Creek	1BLNV000.21	0.21	4/23/78	383705	784755	
Linville Creek	1BLNV001.22	1.22	9/1/93	383624	784813	
Long Meadow Run	1BLOM001.45	1.45	8/3/05	383718	784517	
N.F. Shenandoah River	1BNFS089.81	89.81	2/22/07	383711	784742	
N.F. Shenandoah River	1BNFS090.16	90.16	9/23/99	383717	784806	
N.F. Shenandoah River	1BNFS087.02	87.02	7/18/68	383815	784625	
N.F. Shenandoah River	1BNFS087.81	87.81	7/6/72	383811	784710	
N.F. Shenandoah River	1BNFS088.00	88	7/6/72	383808	784717	
N.F. Shenandoah River	1BNFS088.19	88.19	7/6/72	383801	784721	
N.F. Shenandoah River	1BNFS088.38	88.38	7/6/72	383756	784715	
N.F. Shenandoah River	1BNFS087.35	87.35	8/12/2004	383808	784644	
N.F. Shenandoah River	1BNFS088.81	88.81	8/12/2004	383739	784659	
Linville Creek	1BLNV000.16	0.16	10/2/2001	383706	784744	
Linville Creek	1BLNV000.71	0.71	4/25/91	383643	784802	
Long Meadow Run	1BLOM000.24	0.24	5/1/96	383802	784454	
Plains Mill Spring	1BXDX000.48	0.48	5/1/96	383834	784312	
<b>PUBLIC WATER SUPPLY INTAKES</b>						
<u>OWNER</u>	<u>STREAM</u>	<u>RIVER MILE</u>				
BROADWAY, TOWN OF	NORTH FORK SHENANDOAH	89.87				
BROADWAY, TOWN OF	LINVILLE CREEK	0.08				
FOOD PROCESSORS WA	NORTH FORK SHENANDOAH	88.85				
<b>WATER QUALITY MANAGEMENT PLANNING REGULATION</b>						
Is this discharge addressed in the WQMP regulation? <b>Yes</b>						
If Yes, what effluent limitations or restrictions does the WQMP regulation impose on this discharge?						
<u>PARAMETER</u>	<u>ALLOCATION</u>					
Nurtients under the Watershed General Permit						
<b>WATERSHED NAME</b>						
VAV-B45R North Fork Shenandoah River/Holmans Creek						

## Fact Sheet – VPDES Permit No. VA0090263 – Broadway Regional WWTF

### FLOW FREQUENCY DETERMINATION

The Town of Broadway Regional WWTF discharges to the North Fork Shenandoah River (NFSR) near Timberville, VA. Stream flow frequencies are required at this site for use by the permit writer in developing effluent limitations for the VPDES permit reissuance.

The USGS has operated a continuous record gage on the NFSR near Cootes Store, VA (#01632000) since 1925. The gage is located upstream of the discharge point, 300 ft upstream of the State Route 259 bridge. The flow frequencies for the NFSR in the vicinity of the discharge were determined by drainage area proportions, not including the drainage area of Linville Creek. Linville Creek converges with the NFSR between the Cootes Store gage and Outfall 003. Therefore, Linville Creek stream flows were added to the flows determined for the NFSR. Flows for Linville Creek were considered identical to those for the USGS gage on Linville Creek near Broadway, VA (#01632082). This gage is located 170 ft downstream of the State Route 1421 bridge, less than a mile from the creek's convergence with the NFSR. Broadway WTP and Food Processors Water Cooperative WTP both withdraw water from the NFSR downstream of the NFSR gage and upstream of the discharge point; therefore, the maximum monthly withdrawals from each WTP (based on the Reg. 11 withdrawal reports) have been subtracted from the calculated stream flows. The withdrawals are as follows: Broadway WTP – 0.61 cfs; Food Processors Water Cooperative WTP – 1.98 cfs. Outfall 003 is located at an oxbow where during critical flow conditions the majority of the flow travels through two channels. The channel to which Outfall 003 discharges contains more flow than the other channel; however, as a conservative approach because no actual flow monitoring of the two channels has been performed, ½ of the flow is considered to travel through each channel when developing permit limits:

#### **North Fork Shenandoah River near Cootes Store, VA (#01632000):**

Drainage Area = 210 mi<sup>2</sup>

1Q30 = 0.33 cfs	High Flow 1Q10 = 8.5 cfs
1Q10 = 0.64 cfs	High Flow 7Q10 = 10 cfs
7Q10 = 0.79 cfs	High Flow 30Q10 = 19 cfs
30Q10 = 1.1 cfs	HM = 11 cfs
30Q5 = 1.8 cfs	

#### **Linville Creek near Broadway, VA (#01632082):**

Drainage Area = 45.7 mi<sup>2</sup>

1Q30 = 2.0 cfs	High Flow 1Q10 = 5.3 cfs
1Q10 = 2.9 cfs	High Flow 7Q10 = 6.0 cfs
7Q10 = 3.3 cfs	High Flow 30Q10 = 7.3 cfs
30Q10 = 4.1 cfs	HM = 14 cfs
30Q5 = 4.9 cfs	

#### **North Fork Shenandoah River at Town of Broadway Regional WWTF Outfall 003:**

Drainage Area = 294.4 mi<sup>2</sup>

1Q30 = 0.0 cfs	(0.0 mgd)	High Flow 1Q10 = 12.8 cfs	(4.13 mgd)
1Q10 = 1.07 cfs	(0.35 mgd)	High Flow 7Q10 = 15.2 cfs	(4.93 mgd)
7Q10 = 1.64 cfs	(0.53 mgd)	High Flow 30Q10 = 27.2 cfs	(8.79 mgd)
30Q10 = 2.81 cfs	(0.91 mgd)	HM = 24.4 cfs	(7.90 mgd)
30Q5 = 4.44 cfs	(1.44 mgd)		

The high flow months are January through May.

REVIEWER: Bev Carver

DATE: 8/28/13

## Fact Sheet – VPDES Permit No. VA0090263 – Broadway Regional WWTF

### EFFLUENT/STREAM MIXING EVALUATION

Mixing zone predictions were made with the Virginia DEQ Mixing Zone Analysis Version 2.1 program. The predictions are based on the discharge and receiving stream characteristics, and are presented below.

Annual	Wet Season
<p>Effluent Flow = 2.923 MGD  Stream 7Q10 = 0.53 MGD  Stream 30Q10 = 0.91 MGD  Stream 1Q10 = 0.35 MGD  Stream slope = 0.001 ft/ft  Stream width = 30 ft  Bottom scale = 3  Channel scale = 1</p> <p>-----</p> <p>Mixing Zone Predictions @ 7Q10</p> <p>Depth = .6001 ft  Length = 1281.4 ft  Velocity = .2969 ft/sec  Residence Time = .05 days</p> <p>Recommendation: A complete mix assumption is appropriate for this situation and the entire 7Q10 may be used.</p> <p>-----</p> <p>Mixing Zone Predictions @ 30Q10</p> <p>Depth = .6396 ft  Length = 1212.99 ft  Velocity = .3092 ft/sec  Residence Time = .0454 days</p> <p>Recommendation: A complete mix assumption is appropriate for this situation and the entire 30Q10 may be used.</p> <p>-----</p> <p>Mixing Zone Predictions @ 1Q10</p> <p>Depth = .5809 ft  Length = 1317.57 ft  Velocity = .2907 ft/sec  Residence Time = 1.2588 hours</p> <p>Recommendation: A complete mix assumption is appropriate for this situation providing no more than 79.44% of the 1Q10 is used.</p>	<p>Effluent Flow = 2.923 MGD  Stream 7Q10 = 4.93 MGD  Stream 30Q10 = 8.79 MGD  Stream 1Q10 = 4.13 MGD  Stream slope = 0.001 ft/ft  Stream width = 45 ft  Bottom scale = 3  Channel scale = 1</p> <p>-----</p> <p>Mixing Zone Predictions @ 7Q10</p> <p>Depth = .7686 ft  Length = 2354.33 ft  Velocity = .3515 ft/sec  Residence Time = .0775 days</p> <p>Recommendation: A complete mix assumption is appropriate for this situation and the entire 7Q10 may be used.</p> <p>-----</p> <p>Mixing Zone Predictions @ 30Q10</p> <p>Depth = .9805 ft  Length = 1910.39 ft  Velocity = .4109 ft/sec  Residence Time = .0538 days</p> <p>Recommendation: A complete mix assumption is appropriate for this situation and the entire 30Q10 may be used.</p> <p>-----</p> <p>Mixing Zone Predictions @ 1Q10</p> <p>Depth = .72 ft  Length = 2489.52 ft  Velocity = .337 ft/sec  Residence Time = 2.0523 hours</p> <p>Recommendation: A complete mix assumption is appropriate for this situation providing no more than 48.73% of the 1Q10 is used.</p>



**Fact Sheet – VPDES Permit No. VA0090263 – Broadway Regional WWTF**

**MEMORANDUM  
DEPARTMENT OF ENVIRONMENTAL QUALITY  
VALLEY REGIONAL OFFICE**

4411 Early Road – P.O. Box 3000

Harrisonburg, VA 22801

**SUBJECT:** Site Visit for Reissuance of VPDES Permit No. VA0090263, Town of Broadway WWTF, Rockingham County

**TO:** Permit Processing File

**FROM:** Dawn Jeffries

**DATE:** October 15, 2013

On October 11, 2013 the writer performed a site visit at the existing facility to evaluate the characteristics of the receiving stream for modeling purposes. Keith Showman, Dawn Jeffries, and Brittany Wood were present from DEQ, and John Coffman and Lee Grieco represented the facility. Photos below show the outfall pipe and receiving stream in the vicinity. Stream conditions and channel characteristics were consistent with those noted in the previous flow model.



Outfall 003



Downstream View from 003



Upstream View from 003



Upstream at river divergence

## APPENDIX B

## EFFLUENT SCREENING AND EFFLUENT LIMITATIONS

## EFFLUENT LIMITATIONS

A comparison of technology and water quality-based limits was performed and the most stringent limits were selected, as summarized in the table below.

## Outfall 003

## Final Limits

## Design Flow: 2.923 MGD

PARAMETER	BASIS FOR LIMIT	EFFLUENT LIMITATIONS				MONITORING REQUIREMENTS	
		Monthly Average		Maximum		Frequency	Sample Type
Flow (MGD)	1	NL		NL		Continuous	TIRE
-----	-----	Monthly Average		Weekly Average		-----	-----
CBOD <sub>5</sub> (Jun-Dec)	3,4,5	8 mg/L	90 kg/d	12 mg/L	130 kg/d	5/Week	24 HC
CBOD <sub>5</sub> (Jan-May)	3,4,5	25 mg/L	280 kg/d	40 mg/L	440 kg/d	5/Week	24 HC
TSS	7	20 mg/L	220 kg/d	30 mg/L	330 kg/d	1/Month	24 HC
Ammonia-N (Jun-Dec)(mg/L)	3	1.8		2.2		1/Day	24 HC
Ammonia-N (Jan-May)(mg/L)	3	5.8		7.1		5/Week	24 HC
Effluent Chlorine (TRC)(mg/L)*	3	0.0083		0.0088		12/Day	Grab
E. coli (N/100 mL) (geometric mean)	3,6	83		NA		4/Month* or 3/Week** 10 am to 4 pm	Grab
-----	-----	Annual Average		Maximum		-----	-----
TP – Year to Date (mg/L)	8	NL		NA		1/Month	Calculated
TP – Calendar Year (mg/L)	8,9	0.26		NA		1/Year	Calculated
TN – Year to Date (mg/L)	8	NL		NA		1/Month	Calculated
TN – Calendar Year (mg/L)	8,9	3.5		NA		1/Year	Calculated
-----	-----	Minimum		Maximum		-----	-----
pH (S.U.)	3	6.5		9.5		1/Day	Grab
Dissolved Oxygen (mg/L)	3,4	5.0		NA		1/Day	Grab
Contact Chlorine (TRC)(mg/L)*	3,7	1.0		NA		12/Day	Grab
Chronic Whole Effluent Toxicity (TUC) ( <i>C. dubia</i> & <i>P. promelas</i> )	3	NA		1.72		1/3 Months	24 HC
Acute Whole Effluent Toxicity (%) ( <i>C. dubia</i> )	3	100		NA		1/3 Months	24 HC

NL = No Limitation, monitoring required

NA = Not Applicable

TIRE = Totalizing, Indicating, and Recording equipment

24 HC = 24-Hour Composite

4/Month = 4 samples taken monthly, with at least 1 sample taken each calendar week

3/Week = 3 samples taken during the calendar week no less than 48 hours apart

5/Week = 5 samples taken, one per day, during the calendar week

12/Day = 12 samples taken daily with a minimum separation time of 90 minutes and a maximum separation time of 150 minutes

\* = Applicable only when chlorination is used for disinfection

\*\* = Applicable if an alternative to chlorination is used for disinfection

## BASIS DESCRIPTIONS

1. VPDES Permit Regulation (9VAC25-31)
2. Federal Effluent Requirements (Secondary Treatment Regulation - 40CFR133)
3. Water Quality Standards (9VAC25-260)
4. North Fork Shenandoah River Stream Model
5. WQMP Regulation (9VAC25-720-50)
6. North Fork Shenandoah River TMDL Report
7. Best Professional Judgment (BPJ)
8. GM No. 07-2008, Amendment No. 2, 10/23/07, Permitting Considerations for Facilities in the Chesapeake Bay Watershed
9. Annual average concentration limits are based on the Technology Regulation (9VAC25-40)

## Fact Sheet – VPDES Permit No. VA0090263 – Broadway Regional WWTF

### LIMITING FACTORS – OVERVIEW:

The following potential limiting factors have been considered in developing this permit and fact sheet:

Water Quality Management Plan Regulation (WQMP) (9VAC25-720)	
A. TMDL limits	<b>E. coli</b>
B. Non-TMDL WLAs	<b>None</b>
C. CBP (TN & TP) WLAs	<b>TN and TP via GP VAN010062</b>
Federal Effluent Guidelines	<b>CBOD<sub>5</sub>, TSS, pH</b>
BPJ/Agency Guidance limits	<b>TRC (contact), Ammonia-N, CBOD<sub>5</sub>, TSS</b>
Water Quality-based Limits - numeric	<b>CBOD<sub>5</sub>, DO, TRC (effluent), E. coli, pH, Ammonia-N, WET</b>
Water Quality-based Limits - narrative	<b>None</b>
Technology-based Limits (9VAC25-40-70)	<b>TN, TP</b>
Whole Effluent Toxicity (WET)	<b>See Appendix B, Pages 13-17</b>
Storm Water Limits	<b>NA</b>

### EVALUATION OF THE EFFLUENT – CONVENTIONAL POLLUTANTS:

The discharge for this facility was remodeled using the Regional Stream Model (v 4.11) because new stream flow information and effluent data were available. The values below were demonstrated to maintain the DO WQS. The modeling information is available for review at the DEQ-Valley Regional Office or electronically upon request.

Annual		Wet Season	
CBOD <sub>5</sub> (mg/L)	8	CBOD <sub>5</sub> (mg/L)	25
TKN (mg/L)	3.61	TKN (mg/L)	11.7
DO (mg/L)	5.0	DO (mg/L)	5.0

Based on the municipal sampling schedule table in Guidance Memo No. 14-2003, the monitoring frequency for CBOD<sub>5</sub> was changed from 1/Day to 5/Week. The permittee requested a reduction in the monitoring frequency for BOD<sub>5</sub> from 1/Day to 3/Week. Based on Guidance Memo No. 14-2003, to qualify for consideration of reduced monitoring requirements, the facility should not have been issued any Warning Letters, NOVs, or be under any Consent Orders, Consent Decrees, Executive Compliance Agreements, or related enforcement documents during the past three years. The facility was issued a Warning Letter and two NOVs during the past three years; therefore, the monitoring frequency was not reduced to 3/Week.

In both the annual and wet season models, the effluent TKN concentration is equal to more than twice the Ammonia-N WLAc upon which the Ammonia-N limits are based. Per Department guidance, TKN limits are not required when the modeled TKN effluent concentration is more than twice the Ammonia-N WLA. As such, the Ammonia-N limits (based on chronic toxicity) applied to the permit are deemed adequate for ensuring compliance with the modeled TKN values, and no TKN limits have been included in this permit.

The Chesapeake Bay TMDL TSS allocation for this facility is 175,424 lbs/yr, and the TSS allocation for New Market STP (VA0022853) is 45,683 lbs/yr. New Market STP connected to Broadway in 2011 and terminated its discharge. Although the combined allocations allow for less stringent TSS limits in this permit, the limits have been carried forward based on BPJ as the facility is able to meet its current TSS limits consistently.

The pH limits reflect the WQS for pH in the receiving stream and have been carried forward.

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Because the poultry processing facilities comprise the majority of the influent flow to the facility, 2/Month monitoring for O&G was performed during the previous permit term in order to evaluate the efficiency of the facility in removing O&G. All samples resulted in values below the QL of 5.0 mg/L. Based on effluent data, the town's pretreatment program, and the upgrades to the facility to achieve enhanced nutrient removal, monitoring for this unlimited parameter is no longer required in the permit.

### EVALUATION OF THE EFFLUENT – DISINFECTION:

The North Fork Shenandoah River Bacteria TMDL includes an E. coli WLA of  $3.35 \times 10^{12}$  cfu/year for this facility. Based on the facility's expansion design flow of 2.923 MGD, the E. coli WLA corresponds to a concentration limit of 83 cfu/100 mL. This concentration limit has been carried forward from the previous permit. Since the facility expansion/upgrade, E. coli has been monitored 3/Week, and there have been no compliance concerns; therefore, this frequency has been carried forward and applied in the reissued permit. Chlorine limits are also specified in the permit but are only applicable should the facility need to utilize chlorine disinfection. If chlorination is utilized for disinfection, E. coli monitoring is required 4/Month to demonstrate compliance with the limit.

### EVALUATION OF THE EFFLUENT – NUTRIENTS:

In accordance with § 62.1-44.19:14.C.5. of the Code of Virginia, this Significant Discharger has submitted a Registration Statement and DEQ has recognized that they are covered under the General Virginia Pollutant Discharge Elimination System (VPDES) Watershed Permit Regulation for TN and TP Discharges and Nutrient Trading in the Chesapeake Bay Watershed in Virginia (9VAC25-820) (GP). The effective date of coverage is January 1, 2012. Coverage under the GP will expire December 31, 2016. The load limit for TN is 29,481 pounds per calendar year and for TP is 2,211 pounds per calendar year, including allocations from the Town of New Market of 6,091 lbs/yr of TN and 457 lbs/yr of TP that were transferred due to connection of the town to the facility.

The Regulation for Nutrient Enriched Waters and Dischargers within the Chesapeake Bay Watershed (9VAC25-40-70) stipulates the inclusion of technology-based effluent concentration limits in the individual permit for any facility that has installed technology for the control of nitrogen and phosphorous whether by new construction, expansion, or upgrade. Per the requirements of 9VAC25-40-70, annual average effluent concentration limits of TN = 3.7 mg/L and TP = 0.30 mg/L were previously calculated. The limits have been modified based on the same method and recent irrigation data showing an average irrigation rate of 0.17 mgd. At these annual average concentrations and flows, the load limits will be met without the need to offset any nutrient loads. Effluent data for the existing facility show these concentrations can be met.

$$\text{TN annual average concentration limit} = (29,481 \text{ lbs/yr}) / (365 \text{ days/yr}) / 8.345 / (2.923 \text{ MGD} - 0.17 \text{ MGD}) = 3.5 \text{ mg/L}$$

$$\text{TP annual average concentration limit} = (2,211 \text{ lbs/yr}) / (365 \text{ days/yr}) / 8.345 / (2.923 \text{ MGD} - 0.17 \text{ MGD}) = 0.26 \text{ mg/L}$$

### EVALUATION OF THE EFFLUENT – TOXICS:

Stream: Water quality data for the receiving stream were obtained from Ambient Monitoring Station No. 1BNFS093.53 on the North Fork Shenandoah River at the Rte 259 Bridge and Station No. 1BLNV001.22 on Linville Creek at the Rte 1421 bridge. Both stations are upstream of the discharge points. At critical flow, 79% of the flow is from Linville Creek and 21% is from the North Fork Shenandoah River. During the wet season, 35% of the flow is from Linville Creek and 65% is from the North Fork Shenandoah River. The stream data from each station were averaged in proportion to the flows.

Stream Information			
90% Annual Temp (°C) =	23.5	90% pH (SU) =	8.5
90% Wet Temp (°C) =	17.9	10% pH (SU) =	7.6
Mean Hardness (mg/L) =	220		

All toxic pollutants, including Ammonia-N and TRC, are assumed absent in the receiving stream because there are no data for these parameters directly above the discharge.

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Discharge: The pH and temperature values were obtained from the daily operational data submitted by the permittee. The hardness value was obtained from permittee monitoring and WET tests.

Effluent Information			
90% Annual Temp (°C) =	27.8	90% pH (SU) =	7.73
90% Wet Temp (°C) =	22.6	10% pH (SU) =	7.14
Mean Hardness (mg/L) =	376		

WQC and WLAs were calculated for the WQS parameters for which data are available. The resulting WQC and WLAs are presented in this appendix. Current agency guidelines recommends the evaluation of toxic pollutant limits for TRC and Ammonia-N be based on default effluent concentrations of 20 mg/L and 9 mg/L, respectively. The effluent data were analyzed per the protocol for evaluation of effluent toxic pollutants included in this appendix with the following results:

- TRC: More stringent limits were determined to be necessary at this reissuance. No compliance schedule is included because the facility currently utilizes UV disinfection. The effluent TRC monitoring frequency was increased from 4/Day to 12/Day based on Guidance Memo No. 14-2003.
- Ammonia-N (Jan-May): Less stringent limits were determined to be necessary at this reissuance. The less stringent limits meet antibacksliding requirements because new effluent pH information was available at this reissuance. Based on the municipal sampling schedule table in Guidance Memo No. 14-2003, the monitoring frequency was changed from 1/Day to 5/Week. The Stat.exe evaluation was performed at a monitoring frequency of 1/Day which results in more stringent limits than an evaluation at a frequency of 5/Week; however, effluent data indicate that the limits determined to be necessary using a frequency of 1/Day can be consistently met. The permittee requested a reduction in the monitoring frequency from 1/Day to 3/Week. Based on Guidance Memo No. 14-2003, to qualify for consideration of reduced monitoring requirements, the facility should not have been issued any Warning Letters, NOV's, or be under any Consent Orders, Consent Decrees, Executive Compliance Agreements, or related enforcement documents during the past three years. The facility was issued a Warning Letter and two NOV's during the past three years; therefore, the monitoring frequency was not reduced to 3/Week.
- Ammonia-N (Jun-Dec): Less stringent limits were determined to be necessary at this reissuance. The less stringent limits meet antibacksliding requirements because new effluent pH information was available at this reissuance. Because the Ammonia-N (Jun-Dec) limits are very low and the facility has experience difficulty in meeting Ammonia-N limits during the Jun-Dec period, the monitoring frequency of 1/Day has been carried forward from the previous permit. The permittee requested a reduction in the monitoring frequency from 1/Day to 3/Week. Based on Guidance Memo No. 14-2003, to qualify for consideration of reduced monitoring requirements, the facility should not have been issued any Warning Letters, NOV's, or be under any Consent Orders, Consent Decrees, Executive Compliance Agreements, or related enforcement documents during the past three years. The facility was issued a Warning Letter and two NOV's during the past three years; therefore, the monitoring frequency was not reduced to 3/Week.
- Monitoring data is needed for the pollutants listed in Attachment A. The permittee must monitor the effluent at Outfall 003 for the substances noted in Attachment A of the permit once after the start of the third year from the permit's effective date.

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## WQC-WLA SPREADSHEET INPUT

### WATER QUALITY CRITERIA / WASTE LOAD ALLOCATION ANALYSIS

Facility Name:

Broadway Regional WWTF

Receiving Stream:

N.F. Shenandoah River

Permit No.: VA0090263

Date: 5/8/2014

Version: OWP Guidance Memo 00-2011 (8/24/00)

#### Stream Information

Mean Hardness (as CaCO<sub>3</sub>) = 220 mg/L  
 90% Temperature (Annual) = 23.5 deg C  
 90% Temperature (Wet season) = 17.9 deg C  
 90% Maximum pH = 8.5 SU  
 10% Maximum pH = 7.6 SU  
 Tier Designation = 1  
 Public Water Supply (PWS) Y/N? = N  
 V(alley) or P(iedmont)? = V  
 Trout Present Y/N? = N  
 Early Life Stages Present Y/N? = Y

#### Stream Flows

1Q10 (Annual) = 0.35 MGD  
 7Q10 (Annual) = 0.53 MGD  
 30Q10 (Annual) = 0.91 MGD  
 1Q10 (Wet season) = 4.13 MGD  
 30Q10 (Wet season) = 8.79 MGD  
 30Q5 = 1.44 MGD  
 Harmonic Mean = 7.9 MGD

#### Mixing Information

Annual - 1Q10 Flow = 79.44 %  
 - 7Q10 Flow = 100 %  
 - 30Q10 Flow = 100 %  
 Wet Season - 1Q10 Flow = 48.73 %  
 - 30Q10 Flow = 100 %

#### Effluent Information

Mean Hardness (as CaCO<sub>3</sub>) = 376 mg/L  
 90% Temp (Annual) = 27.8 deg C  
 90% Temp (Wet season) = 22.6 deg C  
 90% Maximum pH = 7.73 SU  
 10% Maximum pH = 7.14 SU  
 Current Discharge Flow = 2.92300 MGD  
 Discharge Flow for Limit Analysis = 2.92300 MGD

#### Footnotes:

- All concentrations expressed as micrograms/liter (ug/l), unless noted otherwise.
- All flow values are expressed as Million Gallons per Day (MGD).
- Discharge volumes are highest monthly average or 2C maximum for Industries and design flows for Municipals.
- Hardness expressed as mg/l CaCO<sub>3</sub>. Standards calculated using Hardness values in the range of 25-400 mg/l CaCO<sub>3</sub>.
- "Public Water Supply" protects for fish & water consumption. "Other Surface Waters" protects for fish consumption only.
- Carcinogen "Y" indicates carcinogenic parameter.
- Ammonia WQSs selected from separate tables, based on pH and temperature.
- Metals measured as Dissolved, unless specified otherwise.
- WLA = Waste Load Allocation (based on standards).
- WLA = Waste Load Allocation (based on standards).
- WLAs are based on mass balances (less background, if data exist).
- Acute - 1 hour avg. concentration not to be exceeded more than 1/3 years.
- Chronic - 4 day avg. concentration (30 day avg. for Ammonia) not to be exceeded more than 1/3 years.
- Mass balances employ 1Q10 for Acute, 30Q10 for Chronic Ammonia, 7Q10 for Other Chronic, 30Q5 for Non-carcinogens, and Harmonic Mean for Carcinogens. Actual flows employed are a function of the mixing analysis and may be less than the actual flows.
- Effluent Limitations are calculated elsewhere using the minimum WLA and EPA's statistical approach (Technical Support Document).

## WQC-WLA SPREADSHEET OUTPUT

Facility Name:

Broadway Regional WWTF

Receiving Stream:

N.F. Shenandoah River

Permit No.:

VA0090263

Date:

5/19/2014

### WATER QUALITY CRITERIA

2.923 MGD Discharge Flow - Mix per "Mixer"

#### Human Health

#### Aquatic Protection

Acute	Chronic
1.3E+01 mg/L	1.4E+00 mg/L
1.0E+01 mg/L	1.4E+00 mg/L
None	None
3.4E+02	1.5E+02
1.7E+01	3.0E+00
2.4E+00	4.3E-03
8.6E+02 mg/L	2.3E+02 mg/L
1.9E-02 mg/L	1.1E-02 mg/L
1.6E+03	2.1E+02
1.6E+01	1.1E+01
4.5E+01	2.6E+01
None	None
6.1E+02	6.7E+01
5.4E+02	5.9E+01
3.2E+01	None
3.5E+02	3.4E+02

#### Public Water Supplies

None  
 None  
 5.6E+00  
 1.0E+01  
 5.0E+00  
 8.0E-03  
 2.5E+02 mg/L  
 None  
 None  
 None  
 None  
 1.3E+03  
 6.2E+01  
 1.5E+01  
 6.1E+02  
 None  
 None  
 7.4E+03

#### Other Surface Waters

None  
 None  
 6.4E+02  
 None  
 None  
 8.1E-03  
 None  
 None  
 None  
 None  
 None  
 None  
 None  
 None  
 None  
 None  
 2.6E+04

### NON-ANTIDEGRADATION WASTE LOAD ALLOCATIONS

2.923 MGD Discharge - Mix per "Mixer"

#### Aquatic Protection

Acute	Chronic
1.4E+01 mg/L	1.8E+00 mg/L
1.7E+01 mg/L	5.8E+00 mg/L
N/A	N/A
3.7E+02	1.8E+02
1.8E+01	3.6E+00
2.6E+00	5.1E-03
9.4E+02 mg/L	2.7E+02 mg/L
2.1E-02 mg/L	1.3E-02 mg/L
1.8E+03	2.5E+02
1.8E+01	1.3E+01
5.0E+01	3.1E+01
N/A	N/A
6.7E+02	7.9E+01
5.9E+02	6.9E+01
3.5E+01	N/A
3.8E+02	4.1E+02

#### Human Health

N/A  
 N/A  
 9.6E+02  
 N/A  
 N/A  
 3.0E-02  
 N/A  
 N/A  
 N/A  
 N/A  
 N/A  
 N/A  
 1.3E+02  
 N/A  
 6.9E+03  
 N/A  
 3.9E+04

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### PROTOCOL FOR THE EVALUATION OF THE EFFLUENT – TOXIC POLLUTANTS

Toxic pollutants were evaluated in accordance with OWP Guidance Memo No. 00-2011. Acute and Chronic WLAs ( $WLA_a$  and  $WLA_c$ ) were analyzed according to the protocol below using a statistical approach (STAT.exe) to determine the necessity and magnitude of limits. Human Health WLAs ( $WLA_{hh}$ ) were analyzed according to the same protocol through a simple comparison with the effluent data. If the  $WLA_{hh}$  exceeded the effluent datum or data mean, no limits were required. If the effluent datum or data mean exceeded the  $WLA_{hh}$ , the  $WLA_{hh}$  was imposed as the limit. Since there are no data available immediately upstream of this discharge, all other upstream (background) pollutant concentrations are assumed to be "0".

The steps used in evaluating the effluent data are as follows:

- A. If all data are reported as "below detection" or  $<$  the required Quantification Level (QL), and at least one detection level is  $\leq$  the required QL, then the pollutant is considered to be not significantly present in the discharge and no further monitoring is required.
  - \* Multiple results were reported as  $\leq$  the respective QL. Although none of the detection levels were  $\leq$  the required QL, because the detection levels were very close to the required QL and multiple samples were performed, the pollutant is considered to be not significantly present in the discharge and no further monitoring is required.
- B. If all data are reported as "below detection", and all detection levels are  $>$  the required QL, then an evaluation is performed in which the pollutant is assumed present at the lowest reported detection level.
  - B.1. If the evaluation indicates that no limits are needed, then the existing data set is adequate and no further monitoring is required.
  - B.2. If the evaluation indicates that limits are needed, then the existing data set is inadequate to make a determination and additional monitoring is required.
- C. If any data value is reported as detectable at or above the required QL, then the data are adequate to determine whether effluent limits are needed.
  - C.1. If the evaluation indicates that no limits are needed, then no further monitoring is required.
  - C.2. If the evaluation indicates that limits are needed, then the limits and associated requirements are specified in the draft permit.
  - C.3. If the evaluation indicates that limits are needed, but the metals data are reported as a form other than "Dissolved", then the existing data set is inadequate to make a determination and additional monitoring is required.



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## TOXLARGE

Parameter	CASRN	QL (ug/L)	Data (ug/L unless noted otherwise)	Source of Data	Data Eval
<b>METALS</b>					
Antimony, dissolved	7440-36-0	0.2	<20.0, <1.0, <1.0, <1.0	b	B.1
Arsenic, dissolved	7440-38-2	1.0	<20.0, <5.0, <5.0, <5.0	b	B.1
Barium, dissolved	7440-39-3	---	Applicable to PWS waters only	---	---
Cadmium, dissolved	7440-43-9	0.3	<1.0, <1.0, <1.0, <1.0	b	B.1
Chromium III, dissolved	16065-83-1	0.5	<10, <5.0, <5.0, <5.0	b	B.1
Chromium VI, dissolved	18540-29-9	0.5	<10, <5.0, <5.0, <5.0	b	B.1
Chromium, Total	7440-47-3	---	Applicable to PWS waters only	---	---
Copper, dissolved	7440-50-8	0.5	<5.0, <5.0, <5.0, <5.0	b	B.1
Iron, dissolved	7439-89-6	1.0	Applicable to PWS waters only	---	---
Lead, dissolved	7439-92-1	0.5	<10.0, <1.0, <1.0, <1.0	b	B.1
Manganese, dissolved	7439-96-5	0.2	Applicable to PWS waters only	---	---
Mercury, dissolved	7439-97-6	1.0	<1.0, <1.0, <1.0, <1.0	b	A
Nickel, dissolved	7440-02-0	0.5	<5.0, <10.0, <10.0, <10.0	b	B.1
Selenium, total recoverable	7782-49-2	2.0	<20.0, <5.0, <5.0, <5.0, <1.0	b	A
Silver, dissolved	7440-22-4	0.2	<5.0, <5.0, <5.0, <5.0	b	B.1
Thallium, dissolved	7440-28-0	---	<10.0, <1.0, <1.0, <1.0	b	A
Zinc, dissolved	7440-66-6	2.0	<20.0, 16.0, 36.5, 25.1	b	B.1
<b>PESTICIDES/PCBS</b>					
Aldrin <sup>C</sup>	309-00-2	0.05	<0.531, <0.051	b	A*
Chlordane <sup>C</sup>	57-74-9	0.2	<5.31, <0.515	b	B.2
Chlorpyrifos	2921-88-2	---	<10.5	b	A
DDD <sup>C</sup>	72-54-8	0.1	<0.531, <0.051	b	A
DDE <sup>C</sup>	72-55-9	0.1	<0.531, <0.051	b	A
DDT <sup>C</sup>	50-29-3	0.1	<0.531, <0.051	b	A
Demeton	8065-48-3	---	<10.5	b	A
Diazinon	333-41-5	---	<b>NEW REQUIREMENT. Needs to be sampled.</b>	---	---
Dieldrin <sup>C</sup>	60-57-1	0.1	<0.531, <0.051	b	A
Alpha-Endosulfan	959-98-8	0.1	<0.531, <0.051	b	A
Beta-Endosulfan	33213-65-9	0.1	<0.531, <0.051	b	A
Alpha-Endosulfan + Beta-Endosulfan		---	<1.062	b	A
Endosulfan Sulfate	1031-07-8	0.1	<0.531	b	B.1
Endrin	72-20-8	0.1	<0.531, <0.051	b	A
Endrin Aldehyde	7421-93-4	---	<0.531	b	A
Guthion	86-50-0	---	<10.5	b	A
Heptachlor <sup>C</sup>	76-44-8	0.05	<0.531, <0.051	b	A*
Heptachlor Epoxide <sup>C</sup>	1024-57-3	---	<0.531	b	A
Hexachlorocyclohexane Alpha-BHC <sup>C</sup>	319-84-6	---	<0.531	b	A
Hexachlorocyclohexane Beta-BHC <sup>C</sup>	319-85-7	---	<0.531	b	A
Hexachlorocyclohexane Gamma-BHC (synonym = Lindane)	58-89-9	---	<0.531	b	A
Kepone	143-50-0	---	<10.5	b	A



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Parameter	CASRN	QL (ug/L)	Data (ug/L unless noted otherwise)	Source of Data	Data Eval
Malathion	121-75-5	---	<10.5	b	A
Methoxychlor	72-43-5	---	<10.5	b	A
Mirex	2385-85-5	---	<10.5	b	A
Parathion	56-38-2	---	<10.5	b	A
PCB Total <sup>C</sup>	1336-36-3	7.0	<3.717	b	A
Toxaphene <sup>C</sup>	8001-35-2	5.0	<5.31, <0.515	b	A
<b>BASE NEUTRAL EXTRACTABLES</b>					
Acenaphthene	83-32-9	10.0	<10.5, <10.4, <11.3, <10.2	b	A*
Anthracene	120-12-7	10.0	<10.5, <10.4, <11.3, <10.2	b	A*
Benzidine <sup>C</sup>	92-87-5	---	<10.5, <10.4, <11.3, <10.2	b	A
Benzo (a) anthracene <sup>C</sup>	56-55-3	10.0	<10.5, <10.4, <11.3, <10.2, <10.6	b	A*
Benzo (b) fluoranthene <sup>C</sup>	205-99-2	10.0	<10.5, <10.4, <11.3, <10.2, <10.6	b	A*
Benzo (k) fluoranthene <sup>C</sup>	207-08-9	10.0	<10.5, <10.4, <11.3, <10.2, <10.6	b	A*
Benzo (a) pyrene <sup>C</sup>	50-32-8	10.0	<10.5, <10.4, <11.3, <10.2, <10.6	b	A*
Bis 2-Chloroethyl Ether <sup>C</sup>	111-44-4	---	<10.5, <10.4, <11.3, <10.2	b	A
Bis 2-Chloroisopropyl Ether	108-60-1	---	<10.5, <10.4, <11.3, <10.2	b	A
Bis-2-Ethylhexyl Phthalate <sup>C</sup>	117-81-7	10.0	<10.5, <10.4, <11.3, <10.2	b	A*
Butyl benzyl phthalate	85-68-7	10.0	<10.5, <10.4, <11.3, <10.2	b	A*
2-Chloronaphthalene	91-58-7	---	<10.5, <10.4, <11.3, <10.2	b	A
Chrysene <sup>C</sup>	218-01-9	10.0	<10.5, <10.4, <11.3, <10.2, <10.6	b	A*
Dibenz(a,h)anthracene <sup>C</sup>	53-70-3	20.0	<10.5, <10.4, <11.3, <10.2	b	A
1,2-Dichlorobenzene	95-50-1	10.0	<10.5, <10.4, <11.3, <10.2	b	A*
1,3-Dichlorobenzene	541-73-1	10.0	<10.5, <10.4, <11.3, <10.2	b	A*
1,4-Dichlorobenzene	106-46-7	10.0	<10.5, <10.4, <11.3, <10.2	b	A*
3,3-Dichlorobenzidine <sup>C</sup>	91-94-1	---	<10.5, <10.4, <11.3, <10.2	b	A
Diethyl phthalate	84-66-2	10.0	<10.5, <10.4, <11.3, <10.2	b	A*
Dimethyl phthalate	131-11-3	---	<10.5, <10.4, <11.3, <10.2	b	A
Di-n-Butyl Phthalate	84-74-2	10.0	<10.5, <10.4, <11.3, <10.2	b	A*
2,4-Dinitrotoluene	121-14-2	10.0	<10.5, <10.4, <11.3, <10.2	b	A*
1,2-Diphenylhydrazine <sup>C</sup>	122-66-7	---	<10.5, <10.4, <11.3, <10.2	b	A
Fluoranthene	206-44-0	10.0	<10.5, <10.4, <11.3, <10.2	b	A*
Fluorene	86-73-7	10.0	<10.5, <10.4, <11.3, <10.2	b	A*
Hexachlorobenzene <sup>C</sup>	118-74-1	---	<10.5, <10.4, <11.3, <10.2	b	A
Hexachlorobutadiene <sup>C</sup>	87-68-3	---	<10.5, <10.4, <11.3, <10.2	b	A
Hexachlorocyclopentadiene	77-47-4	---	<10.5, <10.4, <11.3, <10.2	b	A
Hexachloroethane <sup>C</sup>	67-72-1	---	<10.5, <10.4, <11.3, <10.2	b	A
Indeno(1,2,3-cd)pyrene <sup>C</sup>	193-39-5	20.0	<10.5, <10.4, <11.3, <10.2	b	A*
Isophorone <sup>C</sup>	78-59-1	10.0	<10.5, <10.4, <11.3, <10.2	b	A*
Nitrobenzene	98-95-3	10.0	<10.5, <10.4, <11.3, <10.2	b	A*
N-Nitrosodimethylamine <sup>C</sup>	62-75-9	---	<10.5, <10.4, <11.3, <10.2	b	A
N-Nitrosodi-n-propylamine <sup>C</sup>	621-64-7	---	<10.5, <10.4, <11.3, <10.2	b	A
N-Nitrosodiphenylamine <sup>C</sup>	86-30-6	---	<10.5, <10.4, <11.3, <10.2	b	A
Pyrene	129-00-0	10.0	<10.5, <10.4, <11.3, <10.2	b	A*
1,2,4-Trichlorobenzene	120-82-1	10.0	<10.5, <10.4, <11.3, <10.2	b	A*

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Parameter	CASRN	QL (ug/L)	Data (ug/L unless noted otherwise)	Source of Data	Data Eval
<b>VOLATILES</b>					
Acrolein	107-02-8	---	<50.0, <10, <10, <10	b	A
Acrylonitrile <sup>C</sup>	107-13-1	---	<50.0, <10, <10, <10.0	b	A
Benzene <sup>C</sup>	71-43-2	10.0	<5.0, <1.0, <1.0, <1.0	b	A
Bromoform <sup>C</sup>	75-25-2	10.0	<5.0, <1.0, <1.0, <1.0	b	A
Carbon Tetrachloride <sup>C</sup>	56-23-5	10.0	<5.0, <1.0, <1.0, <1.0	b	A
Chlorobenzene	108-90-7	50.0	<5.0, <1.0, <1.0, <1.0	b	A
Chlorodibromomethane <sup>C</sup>	124-48-1	10.0	<5.0, <1.0, <1.0, <1.0	b	A
Chloroform	67-66-3	10.0	<5.0, <1.0, <1.0, <1.0	b	A
Dichlorobromomethane <sup>C</sup>	75-27-4	10.0	<5.0, <1.0, <1.0, <1.0	b	A
1,2-Dichloroethane <sup>C</sup>	107-06-2	10.0	<5.0, <1.0, <1.0, <1.0	b	A
1,1-Dichloroethylene	75-35-4	10.0	<5.0, <1.0, <1.0, <1.0	b	A
1,2-trans-dichloroethylene	156-60-5	---	<5.0, <1.0, <1.0, <1.0	b	A
1,2-Dichloropropane <sup>C</sup>	78-87-5	---	<5.0, <1.0, <1.0, <1.0	b	A
1,3-Dichloropropene <sup>C</sup>	542-75-6	---	<5.0, <1.0, <1.0, <1.0	b	A
Ethylbenzene	100-41-4	10.0	<5.0, <1.0, <1.0, <1.0	b	A
Methyl Bromide	74-83-9	---	<5.0, <1.0, <1.0, <1.0	b	A
Methylene Chloride <sup>C</sup>	75-09-2	20.0	<5.0, <1.0, <1.0, <1.0	b	A
1,1,2,2-Tetrachloroethane <sup>C</sup>	79-34-5	---	<5.0, <1.0, <1.0, <1.0	b	A
Tetrachloroethylene	127-18-4	10.0	<5.0, <1.0, <1.0, <1.0	b	A
Toluene	10-88-3	10.0	<5.0, <1.0, <1.0, <1.0	b	A
1,1,2-Trichloroethane <sup>C</sup>	79-00-5	---	<5.0, <1.0, <1.0, <1.0	b	A
Trichloroethylene <sup>C</sup>	79-01-6	10.0	<5.0, <1.0, <1.0, <1.0	b	A
Vinyl Chloride <sup>C</sup>	75-01-4	10.0	<5.0, <1.0, <1.0, <1.0	b	A
<b>RADIONUCLIDES</b>					
Beta Particle & Photon Activity (mrem/yr)	N/A	---	Applicable to PWS waters only	---	---
Combined Radium 226 and 228 (pCi/L)	N/A	---	Applicable to PWS waters only	---	---
Gross Alpha Particle Activity (pCi/L)	N/A	---	Applicable to PWS waters only	---	---
Uranium	N/A	---	Applicable to PWS waters only	---	---
<b>ACID EXTRACTABLES</b>					
2-Chlorophenol	95-57-8	10.0	<10.5, <10.4, <10.2	b	A*
2,4-Dichlorophenol	120-83-2	10.0	<10.5, <10.4, <10.2	b	A*
2,4-Dimethylphenol	105-67-9	10.0	<10.5, <10.4, <10.2	b	A*
2,4-Dinitrophenol	51-28-5	---	<10.5, <10.4, <10.2	b	A
2-Methyl-4,6-Dinitrophenol	534-52-1	---	<10.5, <10.4, <10.2	b	A
Nonylphenol	104-40-51	---	<b>NEW REQUIREMENT. Needs to be sampled.</b>	---	---
Pentachlorophenol <sup>C</sup>	87-86-5	50.0	<10.5, <10.4, <10.2	b	A
Phenol	108-95-2	10.0	<10.5, <10.4, <10, <10.2	b	A
2,4,6-Trichlorophenol <sup>C</sup>	88-06-2	10.0	<10.5, <10.4, <10.2	b	A*
<b>MISCELLANEOUS</b>					
Ammonia-N (mg/L) (Annual) (Jun-Dec)	766-41-7	0.2 mg/L	Default = 9 mg/L	a	C.2
Ammonia-N (mg/L) (Wet Season) (Jan-May)	766-41-7	0.2 mg/L	Default = 9 mg/L	a	C.2

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Parameter	CASRN	QL (ug/L)	Data (ug/L unless noted otherwise)	Source of Data	Data Eval
Chloride (mg/L)	16887-00-6	---	175, 80.2	b	C.1
TRC (mg/L)	7782-50-5	0.1 mg/L	Default = 20 mg/L	a	C.2
Cyanide, Free	57-12-5	10.0	(Total) <20, <20, <20 (Free) <20, <5	b	A
2,4-Dichlorophenoxy acetic acid (synonym = 2,4-D)	94-75-7	---	Applicable to PWS waters only	---	---
Dioxin (2,3,7,8-tetrachlorodibenzo-p-dioxin)(ppq)	1746-01-6	0.01	Applicable to Paper Mills & Oil Refineries only	---	---
Foaming Agents (as MBAS)	N/A	---	Applicable to PWS waters only	---	---
Sulfide, dissolved	18496-25-8	100	<b>NEW REQUIREMENT. Needs to be sampled.</b>	---	---
Nitrate as N (mg/L)	14797-55-8	---	Applicable to PWS waters only	---	---
Sulfate (mg/L)	N/A	---	Applicable to PWS waters only	---	---
Total Dissolved Solids (mg/L)	N/A	---	Applicable to PWS waters only	---	---
Tributyltin	60-10-5	---	<0.03	b	A
2-(2,4,5-Trichlorophenoxy) propionic acid (synonym = Silvex)	93-72-1	---	<0.643	b	A
Hardness (mg/L as CaCO <sub>3</sub> )	471-34-1	---	489, 404, 412, 407, 297, 293, 292, 254, 231, 193, 520, 569, 524, 396, 380	b	---

The **superscript "C"** following the parameter name indicates that the substance is a known or suspected carcinogen; human health criteria at risk level 10<sup>-5</sup>.

**CASRN** = Chemical Abstract Service Registry Number for each parameter is referenced in the current Water Quality Standards. A unique numeric identifier designating only one substance. The Chemical Abstract Service is a division of the American Chemical Society.

**“Source of Data” codes:**

a = default effluent concentration  
b = data from permittee monitoring

**"Data Evaluation" codes:**

See section titled PROTOCOL FOR THE EVALUATION OF EFFLUENT TOXIC POLLUTANTS for an explanation of the code used.

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### STAT.EXE RESULTS

<p><b><u>Ammonia-N (Jun-Dec)</u></b>  Chronic averaging period = 30  WLAa = 14  WLAc = 1.8  Q.L. = 0.2  # samples/mo. = 30  # samples/wk. = 7</p> <p>Summary of Statistics:  # observations = 1  Expected Value = 9  Variance = 29.16  C.V. = 0.6  97th percentile daily values = 21.9007  97th percentile 4 day average = 14.9741  97th percentile 30 day average= 10.8544  # &lt; Q.L. = 0  Model used = BPJ Assumptions, type 2 data</p> <p>A limit is needed based on Chronic Toxicity  Maximum Daily Limit = 3.63180616814936  Average Weekly Limit = 2.21797020041528  Average Monthly Limit = 1.8</p> <p>The data are: 9</p>	<p><b><u>Ammonia-N (Jan-May)</u></b>  Chronic averaging period = 30  WLAa = 17  WLAc = 5.8  Q.L. = 0.2  # samples/mo. = 30  # samples/wk. = 7</p> <p>Summary of Statistics:  # observations = 1  Expected Value = 9  Variance = 29.16  C.V. = 0.6  97th percentile daily values = 21.9007  97th percentile 4 day average = 14.9741  97th percentile 30 day average= 10.8544  # &lt; Q.L. = 0  Model used = BPJ Assumptions, type 2 data</p> <p>A limit is needed based on Chronic Toxicity  Maximum Daily Limit = 11.7024865418146  Average Weekly Limit = 7.1467928680048  Average Monthly Limit = 5.8</p> <p>The data are: 9</p>	<p><b><u>TRC</u></b>  Chronic averaging period = 4  WLAa = 0.021  WLAc = 0.013  Q.L. = 0.1  # samples/mo. = 360  # samples/wk. = 84</p> <p>Summary of Statistics:  # observations = 1  Expected Value = 20  Variance = 144  C.V. = 0.6  97th percentile daily values = 48.6683  97th percentile 4 day average = 33.2758  97th percentile 30 day average= 24.1210  # &lt; Q.L. = 0  Model used = BPJ Assumptions, type 2 data</p> <p>A limit is needed based on Chronic Toxicity  Maximum Daily Limit = 0.019013472192692  Average Weekly Limit = 8.81735182795156E-03  Average Monthly Limit = 8.27825054846154E-03</p> <p>The data are: 20</p>
<p><b><u>Arsenic, Dissolved</u></b>  Chronic averaging period = 4  WLAa = 370  WLAc = 180  Q.L. = 1.0  # samples/mo. = 1  # samples/wk. = 1</p> <p>Summary of Statistics:  # observations = 1  Expected Value = 5  Variance = 9  C.V. = 0.6  97th percentile daily values = 12.1670  97th percentile 4 day average = 8.31895  97th percentile 30 day average= 6.03026  # &lt; Q.L. = 0  Model used = BPJ Assumptions, type 2 data</p> <p>No Limit is required for this material</p> <p>The data are: 5</p>	<p><b><u>Cadmium, Dissolved</u></b>  Chronic averaging period = 4  WLAa = 18  WLAc = 3.6  Q.L. = 0.3  # samples/mo. = 1  # samples/wk. = 1</p> <p>Summary of Statistics:  # observations = 1  Expected Value = 1  Variance = .36  C.V. = 0.6  97th percentile daily values = 2.43341  97th percentile 4 day average = 1.66379  97th percentile 30 day average= 1.20605  # &lt; Q.L. = 0  Model used = BPJ Assumptions, type 2 data</p> <p>No Limit is required for this material</p> <p>The data are: 1</p>	<p><b><u>Chlordane</u></b>  Chronic averaging period = 4  WLAa = 2.6  WLAc = 0.0051  Q.L. = 0.2  # samples/mo. = 1  # samples/wk. = 1</p> <p>Summary of Statistics:  # observations = 1  Expected Value = .515  Variance = .095481  C.V. = 0.6  97th percentile daily values = 1.25321  97th percentile 4 day average = .856851  97th percentile 30 day average= .621117  # &lt; Q.L. = 0  Model used = BPJ Assumptions, type 2 data</p> <p>A limit is needed based on Chronic Toxicity  Maximum Daily Limit = 7.45913139867148E-03  Average Weekly Limit = 7.45913139867148E-03  Average Monthly Limit = 7.45913139867148E-03</p> <p>The data are: 0.515</p>

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<p><b><u>Chloride</u></b>  Chronic averaging period = 4  WLAa = 940  WLAc = 270  Q.L. = 1.0  # samples/mo. = 1  # samples/wk. = 1</p> <p>Summary of Statistics:  # observations = 2  Expected Value = 127.6  Variance = 5861.43  C.V. = 0.6  97th percentile daily values = 310.504  97th percentile 4 day average = 212.299  97th percentile 30 day average= 153.892  # &lt; Q.L. = 0  Model used = BPJ Assumptions, type 2 data</p> <p>No Limit is required for this material</p> <p>The data are: 175, 80.2</p>	<p><b><u>Chromium III, Dissolved</u></b>  Chronic averaging period = 4  WLAa = 1800  WLAc = 250  Q.L. = 0.5  # samples/mo. = 1  # samples/wk. = 1</p> <p>Summary of Statistics:  # observations = 1  Expected Value = 5  Variance = 9  C.V. = 0.6  97th percentile daily values = 12.1670  97th percentile 4 day average = 8.31895  97th percentile 30 day average= 6.03026  # &lt; Q.L. = 0  Model used = BPJ Assumptions, type 2 data</p> <p>No Limit is required for this material</p> <p>The data are: 5</p>	<p><b><u>Chromium VI, Dissolved</u></b>  Chronic averaging period = 4  WLAa = 18  WLAc = 13  Q.L. = 0.5  # samples/mo. = 1  # samples/wk. = 1</p> <p>Summary of Statistics:  # observations = 1  Expected Value = 5  Variance = 9  C.V. = 0.6  97th percentile daily values = 12.1670  97th percentile 4 day average = 8.31895  97th percentile 30 day average= 6.03026  # &lt; Q.L. = 0  Model used = BPJ Assumptions, type 2 data</p> <p>No Limit is required for this material</p> <p>The data are: 5</p>
<p><b><u>Copper, Dissolved</u></b>  Chronic averaging period = 4  WLAa = 50  WLAc = 31  Q.L. = 0.5  # samples/mo. = 1  # samples/wk. = 1</p> <p>Summary of Statistics:  # observations = 1  Expected Value = 5  Variance = 9  C.V. = 0.6  97th percentile daily values = 12.1670  97th percentile 4 day average = 8.31895  97th percentile 30 day average= 6.03026  # &lt; Q.L. = 0  Model used = BPJ Assumptions, type 2 data</p> <p>No Limit is required for this material</p> <p>The data are: 5</p>	<p><b><u>Lead, Dissolved</u></b>  Chronic averaging period = 4  WLAa = 670  WLAc = 79  Q.L. = 0.5  # samples/mo. = 1  # samples/wk. = 1</p> <p>Summary of Statistics:  # observations = 1  Expected Value = 1  Variance = .36  C.V. = 0.6  97th percentile daily values = 2.43341  97th percentile 4 day average = 1.66379  97th percentile 30 day average= 1.20605  # &lt; Q.L. = 0  Model used = BPJ Assumptions, type 2 data</p> <p>No Limit is required for this material</p> <p>The data are: 1</p>	<p><b><u>Nickel, Dissolved</u></b>  Chronic averaging period = 4  WLAa = 590  WLAc = 69  Q.L. = 0.5  # samples/mo. = 1  # samples/wk. = 1</p> <p>Summary of Statistics:  # observations = 1  Expected Value = 5  Variance = 9  C.V. = 0.6  97th percentile daily values = 12.1670  97th percentile 4 day average = 8.31895  97th percentile 30 day average= 6.03026  # &lt; Q.L. = 0  Model used = BPJ Assumptions, type 2 data</p> <p>No Limit is required for this material</p> <p>The data are: 5</p>
<p><b><u>Silver, Dissolved</u></b>  Chronic averaging period = 4  WLAa = 35  WLAc =  Q.L. = 0.2  # samples/mo. = 1  # samples/wk. = 1</p> <p>Summary of Statistics:  # observations = 1  Expected Value = 5  Variance = 9  C.V. = 0.6  97th percentile daily values = 12.1670  97th percentile 4 day average = 8.31895  97th percentile 30 day average= 6.03026  # &lt; Q.L. = 0  Model used = BPJ Assumptions, type 2 data</p> <p>No Limit is required for this material</p> <p>The data are: 5</p>	<p><b><u>Zinc, Dissolved</u></b>  Chronic averaging period = 4  WLAa = 380  WLAc = 410  Q.L. = 2.0  # samples/mo. = 1  # samples/wk. = 1</p> <p>Summary of Statistics:  # observations = 3  Expected Value = 25.8666  Variance = 240.870  C.V. = 0.6  97th percentile daily values = 62.9443  97th percentile 4 day average = 43.0367  97th percentile 30 day average= 31.1965  # &lt; Q.L. = 0  Model used = BPJ Assumptions, type 2 data</p> <p>No Limit is required for this material</p> <p>The data are: 16, 36.5, 25.1</p>	

## Fact Sheet – VPDES Permit No. VA0090263 – Broadway Regional WWTF

### WHOLE EFFLUENT TOXICITY (WET) EVALUATION:

#### Applicability of TMP:

DEQ guidance states that a municipal sewage treatment plant with a design flow greater than or equal to 1.0 MGD will be subject to Toxics Management Program (TMP) requirements (TMP Guidance 00-2012, Part IV.2.A).

#### Summary of Toxicity Testing:

The previous permit required chronic and acute monitoring quarterly for *Ceriodaphnia dubia* and *Pimephales promelas*. Maximum limits of TUC = 1.75 and TUA = 1.0 were also included. Tables 1 and 2 contain a summary of the toxicity testing results during the term of the permit. These data were evaluated using the procedures outlined in the TMP guidance.

#### Rationale for Most Sensitive Species:

Per the TMP Guidance and the “published rule” (EPA Form 2A application requirements), both species (*Ceriodaphnia dubia* and *Pimephales promelas*) will be required for chronic testing. Only the more-sensitive species of *Ceriodaphnia dubia* is required for acute testing.

#### Sample Type:

A sample type of 24 hour composite is considered representative of the discharge.

#### Monitoring Period:

Based on the results of toxicity tests in the current permit term, quarterly monitoring is carried forward for both the acute and chronic tests.

#### Evaluation of Acute Instream Waste Concentration (IWCa):

The Acute IWC is greater than 33% (see Table 3). Therefore, the acute toxicity criteria is NOAEC = 100% test/endpoint for use.

Calculation of WLAs: Acute and chronic WLAs were generated from the WETLimit10.xls spreadsheet by entering the design flow, stream flows, and stream mix percentages for the respective stream flows.

#### Dilution Series:

The recommended chronic dilution series is shown in Table 4. The standard 0.5 dilution series is recommended for acute testing. A single dilution NOAEC test with 100% effluent and the control could be required instead at permittee request.

#### Limit Evaluation:

The WLAs are used in the Department’s Stat.exe program in order to perform a statistical evaluation of the acute and chronic test results expressed as Toxicity Units (TUs). The toxicity data are analyzed separately by species and test type (acute or chronic). It is noted that WET limits were initially added to VA0090263 for the new facility at the 2009 permit reissuance, and were based upon BPJ and facility history as no data were available for evaluation; however, the limits applied were not species-specific. Both chronic and acute limits are retained in the permit at this reissuance and applied to the appropriate species.

##### Chronic Limit Evaluation:

The results of the Stat.exe evaluation are shown in Table 5. Based on the evaluation of the chronic toxicity data, a chronic limit is required for WET. The limits are applied as TUC = 1.72 (see Table 3) for both species.

##### Acute Limit Evaluation:

Since the WLAa is < 1.0, the statistical program was not used to evaluate the data. Because the WLAa is < 1.0, if the test results are anything other than a TUA = 1.0, a limit is necessary. Based on acute toxicity data, an acute limit is required for WET and will be applied to C.d. as the more-sensitive species since average percent survival in 100% effluent during the permit term for P.p. was always ≥ 90%. The limit has been applied as a 100% minimum limit rather than the 1.0 maximum TUA limit of the previous permit.

Reviewed: BWC, 6/10/14

**Fact Sheet – VPDES Permit No. VA0090263 – Broadway Regional WWTF**

**Table 1  
Summary of Acute Toxicity Testing (NOAEC)**

Monitoring Period	Test Date	48-hr Static Acute <i>C. dubia</i> %	48-hr Static Acute <i>P. promelas</i> %
1 <sup>st</sup> Qtr.	March 2011	100	100
2 <sup>nd</sup> Qtr.	06/09/11 – 06/11/11	100	100
3 <sup>rd</sup> Qtr.	09/13/11 – 09/19/11	100	100
4 <sup>th</sup> Qtr.	12/8/11 – 12/10/11	100	100
5 <sup>th</sup> Qtr.	3/8/12 – 3/10/12	100	100
6 <sup>th</sup> Qtr.	5/24/12 – 5/26/12	100	100
7 <sup>th</sup> Qtr.	9/20/12 – 9/22/12	100	100
8 <sup>th</sup> Qtr.	10/25/12 – 10/27/12	100	100
9 <sup>th</sup> Qtr.	1/10/13 – 1/12/13	50	100
9 <sup>th</sup> Qtr. Re-test <sup>1</sup>	2/14/13 – 2/16/13	100	---
10 <sup>th</sup> Qtr. (REIC)	4/11/13 – 4/13/13	100	100
10 <sup>th</sup> Qtr. Extra(CBI)	4/10/13 – 4/12/13	100	100
11 <sup>th</sup> Qtr.	7/11/13 – 7/13/13	100	100
12 <sup>th</sup> Qtr.	10/10/13 – 10/12/13	100	100
13 <sup>th</sup> Qtr.	1/16/14 – 1/18/14	100	100
14 <sup>th</sup> Qtr.	4/10/14 – 4/12/14	100	100

<sup>1</sup> Valid 9<sup>th</sup> Qtr tests, but permittee re-tested C.d. voluntarily due to toxicity in original test. P.p. was not included in the re-test. Source of C.d. toxicity undetermined.

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**Table 2  
Summary of Chronic Toxicity Testing (NOEC)**

Monitoring Period	Test Start Date	Chronic 3-Brood Static Renewal Survival and Reproduction <i>Ceriodaphnia dubia</i> (TUC)				Chronic 7-Day Static Renewal Survival and Growth <i>Pimephales promelas</i> (TUC)			
		Survival (TUC)	Repro (TUC)	48-hr LC <sub>50</sub>	% Surv in 100%	Survival (TUC)	Growth (TUC)	48-hr LC <sub>50</sub>	% Surv in 100%
1 <sup>st</sup> Qtr <sup>1</sup>	March 2011	1.0	1.0	>100	100	--	--	--	--
2 <sup>nd</sup> Qtr	06/07/11	1.0	1.0	>100	90	1.0	1.0	>100	92.5
3 <sup>rd</sup> Qtr	09/13/11	1.0	1.0	>100	100	1.0	1.0	>100	87.5
4 <sup>th</sup> Qtr	12/6/11	1.0	1.75	>100	90	1.0	1.0	>100	85.0
5 <sup>th</sup> Qtr	3/6/12	1.0	1.75	>100	90	1.0	1.0	>100	97.5
6 <sup>th</sup> Qtr	5/22/12	1.0	1.0	>100	100	1.0	1.0	>100	87.5
7 <sup>th</sup> Qtr <sup>2</sup>	9/18/12	1.75	2.33	75.70	10	1.0	1.0	>100	95.0
8 <sup>th</sup> Qtr	10/23/12	1.75	>3.08	60.50	100	1.0	1.0	>100	97.5
Re-test <sup>3</sup>	11/27/12	1.0	1.32	>100	100	--	--	--	--
9 <sup>th</sup> Qtr	1/8/13	1.75	1.75	>100	30	1.0	1.75	>100	97.5
10 <sup>th</sup> Qtr <sup>4</sup>	4/8/13	1.00	1.75	>100	100	--	--	--	--
10 <sup>th</sup> Qtr <sup>5</sup>	4/9/13	1.0	1.75	>100	90	1.0	1.0	>100	100
11 <sup>th</sup> Qtr	7/9/13	1.0	1.0	>100	90	1.0	1.0	>100	100
12 <sup>th</sup> Qtr	10/8/13	1.0	1.32	>100	100	1.0	1.0	>100	90
13 <sup>th</sup> Qtr	1/14/14	1.0	1.0	>100	90	1.0	1.0	>100	85
14 <sup>th</sup> Qtr	4/8/14	1.0	1.75	>100	100	1.0	1.0	>100	92.5

- 1 Invalid P.p. test due to high Percent Minimum Significant Difference (PMSD) & permittee notified. No re-test; lab results received after end of testing period (quarter) Testing already required quarterly.
- 2 This facility has occasional periods of non-discharge. Toxicity testing time came at end of quarter and the facility was not discharging, and they pulled this sample internally to meet the quarterly sample requirement. It is not representative of the effluent. Therefore data was not submitted on DMR, nor is it for use in WET statistical evaluation. (A WL was issued.) Instructed permittee by phone 10/15 they may change sampling to earlier in the quarter from now on.
- 3 Voluntarily re-test on C.d. only, based on October test results. Source of toxicity in October test was undetermined.
- 4 CBI test results. Test was simultaneously run with split sample at REIC. P.p. results in this test were invalid due to high PMSD. Lab suggested possible fish pathogen.
- 5 REIC test results. Test was simultaneously run with split sample at CBI. All results valid.



**Table 3**  
**WETLim10.xls Spreadsheet**

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**Table 4**  
**Dilution Series Recommended for Chronic Toxicity Monitoring**

<b>DILUTION SERIES TO RECOMMEND</b>			
<b>Table 4.</b>	<b>Monitoring</b>	<b>Limit</b>	
	<b>% Effluent</b>	<b>TUc</b>	<b>% Effluent</b>
Dilution series based on data mean	100	1.0	
Dilution series to use for limit			58
Dilution factor to recommend:	0.5		0.7615773
Dilution series to recommend:	100.0	1.00	100.0
	50.0	2.00	76.2
	25.0	4.00	58.0
	12.5	8.00	44.2
	6.25	16.00	33.6
Extra dilutions if needed	3.12	32.05	25.6
	1.56	64.10	19.5

**Table 5**  
**Stat.exe Results**

<p>Chemical = Chronic WET, C.d. Chronic averaging period = 4 WLA<sub>A,c</sub> = 3.2853644 WLA<sub>c</sub> = 1.1813206 Q.L. = 1.0 # samples/mo. = 1 # samples/wk. = 1</p> <p>Summary of Statistics: # observations = 15 Expected Value = 1.48177 Variance = .266997 C.V. = 0.348716 97th percentile daily values = 2.64605 97th percentile 4 day average = 2.02137 97th percentile 30 day average = 1.65922 # &lt; Q.L. = 0 Model used = lognormal</p> <p>A limit is needed based on Chronic Toxicity Maximum Daily Limit = 1.54638703702207 Average Weekly limit = 1.54638703702207 Average Monthly Limit = 1.54638703702207</p> <p>The data are: 1, 1, 1, 1.75, 1.75, 1, 3.08, 1.32, 1.75, 1.75, 1.75, 1, 1.32, 1, 1.75</p>	<p>Chemical = Chronic WET, P.p. Chronic averaging period = 4 WLA<sub>A,c</sub> = 3.2853644 WLA<sub>c</sub> = 1.1813206 Q.L. = 1.0 # samples/mo. = 1 # samples/wk. = 1</p> <p>Summary of Statistics: # observations = 12 Expected Value = 1.06150 Variance = .029793 C.V. = 0.162606 97th percentile daily values = 1.41978 97th percentile 4 day average = 1.23253 97th percentile 30 day average = 1.12077 # &lt; Q.L. = 0 Model used = lognormal</p> <p>A limit is needed based on Chronic Toxicity Maximum Daily Limit = 1.36079449362568 Average Weekly limit = 1.36079449362568 Average Monthly Limit = 1.36079449362568</p> <p>The data are: 1, 1, 1, 1, 1, 1, 1.75, 1, 1, 1, 1</p>
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Note: The WET limit of 1.72 from Table 3 is used rather than those determined by Stat.exe. Differences are due to the number of observations being greater than 10, which affects the C.V. in this program in ways that may not be accurate for toxicity tests.

**APPENDIX C**

**BASES FOR LIMITATIONS AND MONITORING REQUIREMENTS  
FOR LAND APPLICATION OF WASTEWATER**

**Municipal Wastewater Monitoring**

PARAMETER	BASIS FOR LIMITS	LIMITATIONS	MONITORING REQUIREMENTS	
			Frequency	Sample Type
Total Volume Land Applied (MG)	1,2,3,4	NL	Continuous	Measured
Total Volume to Each Site (MG)	1,2	(a)	Continuous	Measured
pH (S.U.)	1,2,4	6.0 – 12.0	1/Day <sup>b</sup>	Grab
BOD <sub>5</sub> (mg/L)	1,2,3	60 (maximum)	1/Month	Composite
Total Residual Chlorine (TRC) (mg/L)	1,3,4	2.0 (minimum)	1/Day <sup>b</sup>	Grab
TKN (mg/L)	1,2	NL	1/Month	Composite
Ammonia-N (NH <sub>3</sub> -N)(mg/L)	1,2	NL	1/Month	Composite
Nitrate-N (NO <sub>3</sub> -N (mg/L)	1,2	NL	1/Month	Composite
Plant Available Nitrogen (PAN) (Lbs/Gal)	1,2	NL	1/Month	Calculated
PAN Applied to Each Site (Lbs/Ac)	1,2	(c)	1/Month	Calculated
Total Phosphorus (mg/L)	1,2	NL	1/Month	Composite
Phosphate (P <sub>2</sub> O <sub>5</sub> ) (Lbs/Gal)	1,2	NL	1/Month	Calculated
P <sub>2</sub> O <sub>5</sub> Applied to Each Site (Lbs/Ac)	1,2	(c)	1/Month	Calculated
Chlorides (mg/L)	1,2	NL	1/Month	Composite

NL = No Limitation, monitoring required

Composite = A representative composite sample shall be comprised of at least four volume average or weight average grab samples composited over a daily operating period.

- a. Limited by Part III.B.7 and Part III.B.8 of the permit.
- b. Monitoring for pH and TRC shall be performed each day that wastewater is land applied.
- c. Limited by Part III.B.6 of the permit.

*Bases for Effluent Limitations*

1. *VPA Permit Manual*
2. *Guidance Memorandum No. 01-2005, Spray Irrigation and Reuse of Wastewater*
3. *Sewage Collection and Treatment Regulations (9VAC25-790)*
4. *Best Professional Judgment (BPJ)*

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### Soil Monitoring

PARAMETER	BASIS FOR LIMITS	LIMITATIONS	MONITORING REQUIREMENTS	
			Frequency	Sample Type
Soil pH (S.U.)	1,2	NL	1/Year	Composite
Available Phosphorus (mg/kg)	1,2	NL	1/Year	Composite
Cation Exchange Capacity (meq/100 g)	1,2	NL	1/Year	Composite
Exchangeable Potassium (mg/kg)	1,2	NL	1/Year	Composite
Exchangeable Sodium (mg/kg)	1,2,3	NL	1/Year	Composite
Exchangeable Calcium (mg/kg)	1,2,3	NL	1/Year	Composite
Exchangeable Magnesium (mg/kg)	1,2,3	NL	1/Year	Composite
Exchangeable Sodium Percentage (%)	1,2,3	NL	1/Year	Calculated
Hydraulic Conductivity (in/hr)	1,2	NL	1/5 Years	Measured

NL = No Limitation, monitoring required

Composite = Soil composite samples shall be representative of the soil types delineated by the SCS Soil Survey (or the equivalent). Samples shall be taken at 0-6 inches soil depth for each application site. Sampling shall be performed as outlined in the approved O&M Manual.

#### Bases for Effluent Limitations

1. VPA Permit Manual
2. Guidance Memorandum No. 01-2005, Spray Irrigation and Reuse of Wastewater
3. Best Professional Judgment (BPJ)

### Ground Water Monitoring

PARAMETER	BASIS FOR LIMITS	LIMITATIONS	MONITORING REQUIREMENTS	
			Frequency	Sample Type
Static Water Level (0.01 ft)	1,2,3	NL	1/Year	Measured
pH (S.U.)	1,2,3	NL	1/Year	Grab
Total Organic Carbon (mg/L)	1,2,3	NL	1/Year	Grab
Chlorides (mg/L)	1,2,3	NL	1/Year	Grab
Total Dissolved Solids (mg/L)	1,2,3	NL	1/Year	Grab
Nitrate-N (NO <sub>3</sub> -N)(mg/L)	1,2,3	NL	1/Year	Grab
Conductivity (mmhos/cm)	1,3	NL	1/Year	Grab

NL = No Limitation, monitoring required

#### Bases for Effluent Limitations

1. VPA Permit Manual
2. Guidance Memorandum No. 01-2005, Spray Irrigation and Reuse of Wastewater
3. Guidance Memorandum No. 98-2010, VPDES Permit and VPA Permit Ground Water Monitoring

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The land application portion of this permit was reissued in accordance with the VPA Permit Manual. The monitoring requirements and frequencies and the special conditions were imposed in compliance with the manual and applicable guidance memorandum.

### Wastewater Monitoring Prior to Land Application

Monitoring for Total Volume was replaced with monitoring for Total Volume Land Applied to make the requirement consistent with other recently issued VPA permits. The maximum pH limit has been increased to 12.0 S.U. during this reissuance based on a request from the permittee to allow the wastewater to adjust the soil pH, which is consistent with other VPA permits that allow for lime stabilized biosolids to be used as a soil amendment. The monitoring requirement and limit for TSS has been removed based on the consistent nature of the past monitoring data for TSS and the fact that TSS monitoring and limitations are not specified for land treatment systems in the SCAT Regulations. The calculation requirement for Organic Nitrogen was removed at this reissuance as the Organic Nitrogen of the wastewater can be calculated from the TKN and Ammonia-N monitoring data if necessary. Monitoring for the following parameters has been removed at this reissuance based on a review of wastewater and soil monitoring data collected during the previous permit term and current guidance: Sulfate, Potassium, Potassium as K<sub>2</sub>O, TOC, COD, Conductivity, Oil & Grease, Total Arsenic, Total Boron, Total Calcium, Total Cadmium, Total Copper, Total Lead, Total Magnesium, Total Mercury, Total Molybdenum, Total Nickel, Total Selenium Total Sodium, and Total Zinc. The monitoring frequency for all parameters that were previously required 1/Week has been reduced to 1/Month based on the consistent nature of the past monitoring data.

### Soil Monitoring

The soil monitoring frequency has been carried forward from the previous permit which is 1/Year for all parameters except for Hydraulic Conductivity which is required 1/5 Years. In order to further characterize the effects of sodium in the wastewater being land applied, calculating and reporting for Exchangeable Sodium Percentage has been included. Monitoring for the following parameters has been removed at this reissuance based on a review of wastewater and soil monitoring data collected during the previous permit term and current guidance: Soil Organic Matter, Total Nitrogen, Organic Nitrogen, Nitrate Nitrogen, Soluble Salt, Total Arsenic, Total Cadmium, Total Copper, Total Lead, Total Mercury, Total Molybdenum, Total Nickel, and Total Selenium.

The Exchangeable Sodium Percentage (ESP) for each field was calculated based on the 2014 soil monitoring data with the following results:

Field ID	ESP (%)	Field ID	ESP (%)
C-1	1.2	G-1	1.2
D-1	1.3	H-1	1.1
D-2	0.3	L-B	0.9
E-1	1.9	L-H	0.7
E-2	0.7	M-1	0.1
E-3	0.8		

As ESP increases, soil structure decreases resulting in a possible reduction in the infiltration rate of water into the soil and a reduction in the rate of water movement through soil. The target range for ESP is less than 3%, but negative impacts to soils typically do not occur at ESP values less than 6%.

### Ground Water Monitoring

Ground water monitoring wells were installed and monitoring has been performed to determine if the system integrity is being maintained and to indicate if activities at the site are resulting in violations of the Board's Ground Water Standards. Based on a review of the existing wastewater and ground water monitoring data, further ground water monitoring for Ammonia-N, Sulfate, COD, Total Coliform, Total Dissolved Copper, Total Dissolved Nickel, Total Dissolved Zinc, Total Dissolved Cadmium, Total Dissolved Lead, Total Dissolved Mercury, Total Dissolved Molybdenum, Total Dissolved Arsenic, and Total Dissolved Selenium was determined to not be necessary. Monitoring for all other parameters has been carried forward from the previous permit. The monitoring frequency for all parameters that were previously required 2/Year has been reduced to 1/Year based on the consistent nature of the past monitoring data and a request by the permittee.

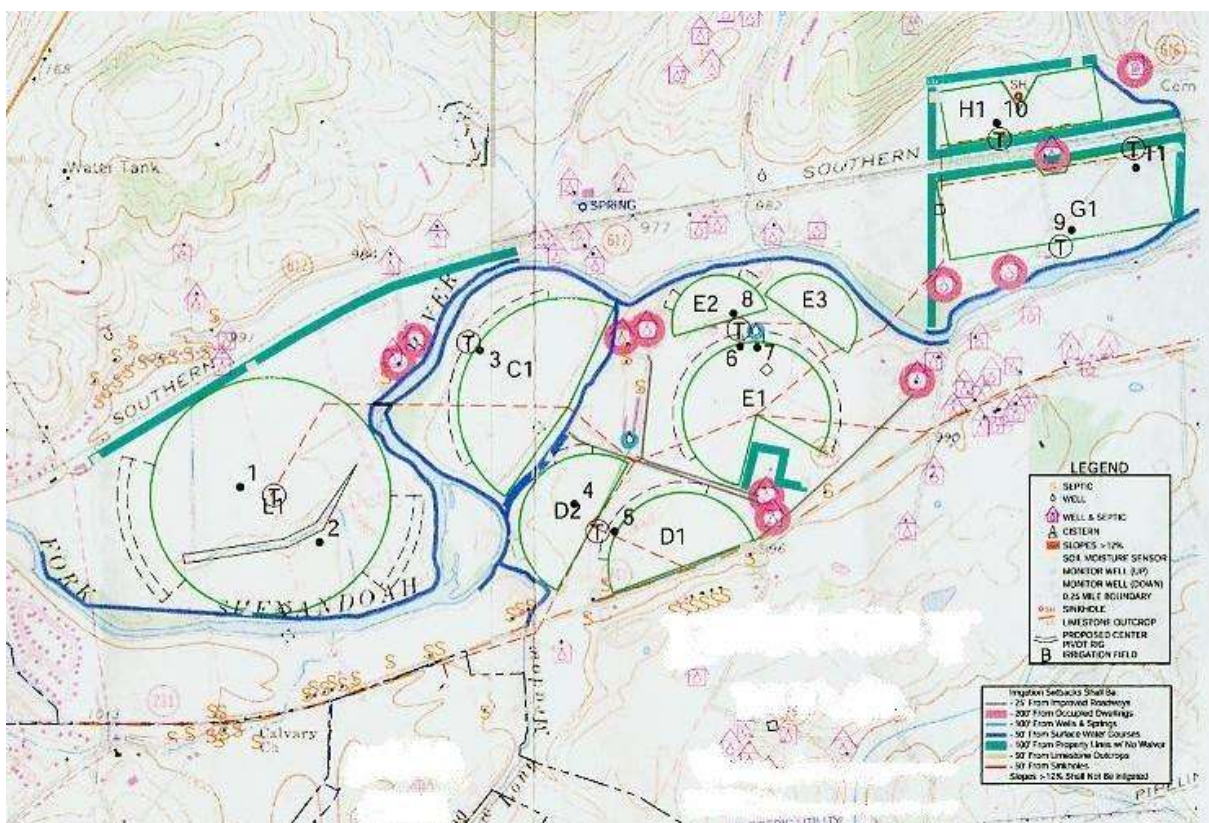
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The permit requires the submittal of a revised Ground Water Monitoring Plan (GWMP) within 90 days of the effective date of the permit. The permit also requires the submittal of an evaluation of the ground water monitoring data by January 10th of each year. The evaluation shall include a summary of the past year's data, a statistical analysis of the data, and a statement as to whether ground water impacts are occurring. The evaluation must be prepared and signed by either a Professional Engineer or Professional Geologist. If the evaluation indicates that ground water impacts are occurring, the permittee shall submit a risk analysis and a corrective action plan by June 30th of the same year. The plan shall set forth the steps to be taken by the permittee to ensure that the contamination source is eliminated or that the contaminated plume is contained on the permittee's property. Available groundwater data from 2000 to present were submitted to Laura Stuart of the DEQ-VRO for review and recommendation. Her analysis is presented in a memorandum included at the end of this appendix.

### Land Application Sites

There are twelve fields that are approved for the land application of wastewater. The table below shows the acreage available for irrigation in each field. The total acreage available for irrigation is 530.3 acres. Because the facility has the option to discharge wastewater to North Fork Shenandoah River, a land area determination is not necessary.

Field ID	Irrigated Acres	Field ID	Irrigated Acres
C-1	59.6	G-1	47.8
D-1	29.3	H-1	27.9
D-2	26.3	L-B	93.0
E-1	44.9	L-H	91.0
E-2	11.5	M-1	87.9
E-3	11.1		



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At permit issuance, a Technical Committee consisting of DEQ, VDH, DCR, and Virginia Tech Extension staff was formed to evaluate the land application project. Based on agency guidance and recommendations of the Technical Committee, the permittee was required to develop several plans in order to adequately address site specific issues at this facility. The plans developed include the following:

### Nutrient Management Plan (NMP)

The current NMP was approved on May 22, 2014. The NMP was developed by a DCR Certified Nutrient Management Planner and provides the N, P, and K nutrient needs for all twelve irrigation sites. For the duration of this plan, only corn and soybeans have been identified as potential crops. PAN and Phosphate will be limited as outlined in the NMP. The NMP is considered to be part of the approved O&M Manual.

### Soil Moisture Monitoring Plan (SMMP)

The current SMMP was approved June 6, 2004. A SMMP was developed in order to ensure that irrigated water does not pass below the root zone. The SMMP describes the soil moisture monitoring devices selected for the project that allow the facility to control irrigation events in accordance with all permit requirements and is reapproved at this reissuance. The SMMP is considered to be part of the approved O&M Manual.

### Irrigation Schedules

Irrigation Schedules for differing crop rotations were developed and approved based upon crop water use and evapotranspiration rates and are reapproved at this reissuance. The Irrigation Schedules are considered to be part of the approved O&M Manual. Based on a request by the permittee, the maximum irrigation rate per pass on fields with  $\geq 60\%$  ground or crop canopy cover was increased from 0.50 inches to 1.0 inches.

### Cation Imbalance Plan (CIP)

A CIP was developed and approved to correct cation imbalances (from sodium in wastewater) should they develop at the spray sites and is reapproved at this reissuance. The plan identified that an SAR greater than 13 is considered critical in that significant impacts to the soil structure may occur when SAR values approach that level. The CIP specifies that soil SAR will be evaluated annually. The CIP is considered to be part of the approved O&M Manual.

The SAR for each field was calculated based on the 2014 soil monitoring data with the following results:

Field ID	SAR	Field ID	SAR
C-1	0.15	G-1	0.14
D-1	0.19	H-1	0.15
D-2	0.08	L-B	0.12
E-1	0.26	L-H	0.11
E-2	0.11	M-1	0.04
E-3	0.11		

### Field Rut Remediation Plan

A Field Rut Remediation Plan was developed and approved to address field ruts that may develop in the proposed spray fields as the result of the operation of spray irrigation equipment and is reapproved at this reissuance. The Field Rut Remediation Plan is considered to be part of the approved O&M Manual.

### Soil Conservation Plans

Soil Conservation Plans were developed and approved based upon USDA Natural Resources Conservation Service (NRCS) criteria and achieve a maximum soil loss of "T" and are reapproved at this reissuance. The Soil Conservation Plans are considered to be part of the approved O&M Manual.





**Memorandum**

**TO:** File

**FROM:** Laura Stuart, P.G.  
Waste Groundwater Specialist

**DATE:** July 18, 2014

**SUBJECT:** Broadway WWTP, VPDES Permit No. VA 0090263

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The Groundwater Monitoring Plan (GMP) and the groundwater results for above-referenced facility have been reviewed following applicable parts of the Virginia Solid Waste Management Regulation (VSWMR) 9 VAC 20-81-250, Virginia Water Quality Regulation 9 VAC 25-, and existing EPA guidance documents to ensure that the technical content is adequate to describe the a groundwater monitoring program. Based on a review of the results and the discussion above, I have the following technical comments organized to topics in the GMP:

A. Site Hydrogeology.

A groundwater flow contour map should be provided to support the placement of the monitoring well locations.

B. Monitor Well Design and Installation.

Boring logs and well completion reports should be included with the GMP.

C. Monitor Parameters and Sampling Frequency.

Sampling with bailers is not recommended and purging to dryness should be avoided. The use of bailers can contribute to the collection of non-representative groundwater samples through overdevelopment of the well and increased mobilization of colloids in the subsurface, allowing increasingly agitated groundwater recharging into the well.

To ensure that the groundwater samples accurately reflect groundwater conditions at the site, well purging and sampling techniques can be adjusted to reduce the disturbance of the water column within the well and reduce excessive turbidity. Low flow purging and sampling can be performed to achieve this, by purging and sampling the well at 0.2 to 0.3 L/min.

Periodically monitoring for indicator parameters, such as turbidity, dissolved oxygen, conductivity and temperature, to ensure that these parameters are stabilized within at least 10% over the last two measurements, will ensure that the sample is indicative of the current groundwater conditions. Discussion on purging and sampling techniques can be found at [http://www.epa.gov/epawaste/hazard/correctiveaction/resources/guidance/sitechar/gwmonitr/rcra\\_gw.pdf](http://www.epa.gov/epawaste/hazard/correctiveaction/resources/guidance/sitechar/gwmonitr/rcra_gw.pdf) and <http://www.solinst.com/Res/papers/407EPA.html>.

The purging and sampling procedure should be described. This includes a description of static water level collection, the well and constituent sampling orders, sample preservation methods, field quality control procedures, and chain of custody.



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### D. Sampling Protocol.

Now that the laboratory accreditation program (VELAP) has been established in the Commonwealth, laboratory accreditation is required before any environmental analyses performed by a commercial environmental laboratory is used for the purposes of the Virginia Air Pollution Control Law, the Virginia Waste Management Act or the State Water Control Law (§ 10.1-1300 et seq., § 10.1-1400 et seq., and § 62.1-44.2 et seq., respectively, of the Code of Virginia).

Laboratory analytical methods should achieve a quantitation limit at least equal to the MCL or groundwater standard.

### E. Evaluation of Groundwater Quality Data.

The monitoring plan should note to what standard the groundwater data will be compared, i.e., point-to-point comparison or statistical methods for comparison to groundwater standards. If using statistical procedures, the GMP should describe those procedures.

The review also evaluated the static groundwater elevations and groundwater sampling results. Since all groundwater in Virginia could be considered potential groundwater use, the groundwater data was compared directly to the Federal Maximum Contaminant Level (MCL) for those constituents that have an MCL and to other available standard or criteria (see <http://water.epa.gov/drink/contaminants/index.cfm#List>; [LIS > Administrative Code > 9VAC25-280](http://www.gpo.gov/fdsys/pkg/CFR-2010-title40-vol22/pdf/CFR-2010-title40-vol22-part141-subpartG.pdf); <http://www.gpo.gov/fdsys/pkg/CFR-2010-title40-vol22/pdf/CFR-2010-title40-vol22-part141-subpartG.pdf>). In order to evaluate the groundwater, the data was copied from <U:\WATER PERMITS\PERMITS\GROUNDWATER MONITORING\Town of Broadway Regional WWTF\Broadway VA0090263 Well Monitoring.xlsm> into <U:\WATER PERMITS\PERMITS\GROUNDWATER MONITORING\Town of Broadway Regional WWTF\Broadway VA0090263 GW Charts>, where each folder represents the groundwater data for each field application area. The upgradient well(s) data was compared to the downgradient wells for each field application area and was plotted onto charts for calculation of linear trends. A few notes on the charts: 1) the BG1, BG2, BG3, BG5 & BG6 data points were given arbitrary dates of Jan. 2000 to Jan. 2001 in order for the charts to display the correct axis data, 2) any cells with BDL or asterisks in the original data were changed to blank cells and shown as missing data in order for the charts to correctly calculate trends, and 3) the upgradient and downgradient wells selected for the charts were based solely on the descriptions provided in the plan.

- Conductivity is generally increasing in each application field area, in both upgradient and downgradient wells. Specific conductance or conductivity is a measure of the ability of water to pass an electrical current and is highly dependent on the amount of dissolved solids in the water, i.e., the presence of inorganic dissolved solids such as chloride, nitrate, sulfate, and phosphate anions (ions that carry a negative charge) or sodium, magnesium, calcium, iron, and aluminum cations (ions that carry a positive charge). Conductivity is also affected by temperature (the warmer the water, the higher the conductivity) and sampling techniques (elevated dissolved solids through agitation of the water sample collection) [[5.9 Conductivity | Monitoring & Assessment | US EPA](#); <https://store.usgs.gov/yimages/PDF/205463.pdf>].
- pH is stable or slightly decreasing in each field application area and is generally consistent between each field. Keep in mind that the effects of acid rainfall can contribute to decreasing pH in groundwater and surface waters [[Water properties: pH, from USGS Water-Science School](#)].

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- Chloride concentrations are generally increasing in each field area, in both upgradient and downgradient wells. Concentrations were elevated above the groundwater standard of 25 mg/L in the majority of background samples in upgradient wells MW15 & MW19 (Fields C1 & D1/D2), MW18 (Field E/E2/E3) and MW-28 and MW29 (Field M1). Exceedances were also noted in downgradient wells MW27, MW28, MW31, MW32 & MW33 (Field M1), MW17 & MW20 (Field E1/E2/E3), MW12 & MW16 (Field C1), and MW8, MW9 & MW10 (Field L1). Chloride is often associated with saltwater intrusion, mineral dissolution, and from industrial and domestic waste [<http://water.usgs.gov/edu/groundwater-contaminants.html>].
- Ammonia is generally low across each field application area and exhibits decreasing concentrations. Within the past 3 years (2011-2013), Ammonia exceeded a groundwater standard in MW3 (Field MRRS), MW8 (Field L1), MW15, MW19, MW13, MW14, MW12 & MW16 (Fields C1 & D1/D1), MW17 (Field E1/E2/E3), MW22 & MW25 (Field G1/H1) and MW28, MW31 & MW33 (Field M1). Ammonia, a compound of nitrogen and hydrogen, is one of the primary forms of dissolved nitrogen in natural water, but may also result from natural decaying organics in soil, and from agriculture, atmospheric, residential/urban uses and industrial sources. Ammonia is soluble in water but is not stable in most environments. It usually is transformed biologically to nitrate in water that contains oxygen (nitrification), and can be transformed to nitrogen gas in water that is low in oxygen. When oxygen is abundant in the ground water, ammonia changes to nitrate over short distances through nitrification, i.e., an absence of ammonia and the presence of nitrate in water would be consistent with sufficient transport time and oxygen being available to change ammonia to nitrate through nitrification [[Ammonia Nitrogen Fish Toxicity Surface Water](#); [National look at nitrate contamination of Ground Water](#); [NITRATE POLLUTION OF GROUNDWATER](#)].
- COD is stable or increasing in each field application area.
- Nitrate is stable or generally decreasing across the site, but some concentrations are above standards. Nitrate, a compound of nitrogen and oxygen, is a primary form of dissolved nitrogen in natural water, but may also be a plant nutrient supplied by inorganic fertilizer and animal manure, and additionally, airborne nitrogen compounds emitted by industry and automobiles deposited on the land and other nonagricultural sources of nitrate, such as septic systems. Nitrate is soluble in water and can easily pass through soil to the water table. Nitrate is highly soluble in water and is stable over a wide range of environmental conditions. It is readily transported in ground water and streams, but persists for a longer period of time, i.e., it doesn't degrade rapidly in the groundwater environment. Increasing nitrate concentrations would suggest that nitrogen can no longer be taken up by the soil and as a result, is leached into groundwater [[National look at nitrate contamination of Ground Water](#); [NITRATE POLLUTION OF GROUNDWATER](#)].
- No consistent trend was identified for Sulfate, since it was decreasing in most wells, but stable or increasing in one or two wells in each application area. No exceedances were noted except for MW15 (Fields C1 & D1/D2), prior to 2004 and MW27 (Field M1) prior to 2008. Elevated concentrations may be due to saltwater intrusion, mineral dissolution, and from domestic or industrial waste [<http://water.usgs.gov/edu/groundwater-contaminants.html>].
- No consistent trend was identified for Total Dissolved Solids (TDS) concentrations, as TDS was decreasing, increasing and stable between each field application area. Related to conductivity, dissolved solids are affected primarily by the geology of the area through which



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the water flows and are derived mainly from minerals in rocks near the land surface and in the aquifer. However, the presence of inorganic dissolved solids such as chloride, nitrate, and sulfate will influence TDS results. TDS exceeded a groundwater standard in MW15 & MW-19 (Fields C1 & D1/D2), MW-17, MW18 & MW-20 (Field E1/E2/E3) and MW27, MW28, MW-29, MW-30, MW31 & MW-33 (Field M1).

- TOC concentrations are decreasing in each field application area. No exceedances have been noted since 2007 in Field M1, Field G1/H1, Field E1/E2/E3 and Field L1.
- Total Coliform concentrations are increasing in most wells, but notably in both the upgradient and downgradient wells within each field application area. This suggests that coliform concentrations may not solely be the result of the application areas. Coliform is typically used as an indicator for the presence of pathogenic bacteria, viruses, and parasites from domestic sewage, animal waste, or plant or soil material  
[\[http://water.usgs.gov/edu/groundwater-contaminants.html\]](http://water.usgs.gov/edu/groundwater-contaminants.html).
- Metals: Trends were generally not evaluated for the Metals data because there were typically one or two detects in any well. Mercury and Arsenic exceeded an MCL during one or more historical sampling events, but only Arsenic exceeded a MCL in MW5 during the past 3 years.
- Groundwater elevations for Field L1 suggest that MW7 is not upgradient.

Based on the review noted in the above paragraphs, the following actions are recommended:

- 1) Revise the GMP to include the following information:
  - a) All well boring logs and well completion reports.
  - b) Groundwater flow direction map.
  - c) Description of the procedures for collecting static water levels.
  - d) Description of the well purging and sampling procedures, as well as all field quality control and chain of custody procedures.
- 2) There were spikes in the concentrations of chloride, ammonia, nitrate, and TDS during one or more of historical sampling event that were above an MCL or other standard. If this situation occurs again, the facility may want to consider re-sampling the well(s) for the constituent as part of a verification sampling process. The verification process includes another groundwater sample taken with 30 days of the initial sampling event to either confirm or refute the elevated concentration prior to making a decision on an exceedance and moving into corrective action.
- 3) Laboratory quantitation limits should at least be the equal to the standard, i.e. 0.0256 mg/L for Ammonia.
- 4) Re-evaluate the groundwater elevations collected at the site to verify that the upgradient and downgradient wells are accurately located.

The facility may wish to review the following document as a guide to developing a GMP:

[U:\WATER PERMITS\PERMITS\GROUNDWATER MONITORING\GMP\\_Sampling Protocol Information\\_LS-FINAL.pdf](#). Questions regarding this review should be addressed to Laura Stuart by phone at (540) 574-7910 or by e-mail at [laura.stuart@deq.virginia.gov](mailto:laura.stuart@deq.virginia.gov).

**BIOSOLIDS LIMITATIONS AND MONITORING REQUIREMENTS**

**Metals Limitations & Monitoring**

PARAMETER <sup>(1)</sup>	BASIS FOR LIMITS	LIMITATIONS		MONITORING REQUIREMENTS	
		Monthly Average (mg/kg) <sup>(1)(2)(3)</sup>	Maximum (mg/kg) <sup>(1)(2)(4)</sup>	Frequency <sup>(5)</sup>	Sample Type
Arsenic	1	41	75	1/3 Months	Composite
Cadmium	1	39	85	1/3 Months	Composite
Copper	1	1,500	4,300	1/3 Months	Composite
Lead	1	300	840	1/3 Months	Composite
Mercury	1	17	57	1/3 Months	Composite
Molybdenum	1	NL <sup>(6)</sup>	75	1/3 Months	Composite
Nickel	1	420	420	1/3 Months	Composite
Selenium	1	100	100	1/3 Months	Composite
Zinc	1	2,800	7,500	1/3 Months	Composite

NL = No Limit, monitoring required

1/3 Months = Sampling each calendar quarter with the results submitted by February 19<sup>th</sup> of each year

- (1) All parameters are subject to pollutant concentrations (PC), cumulative pollutant loading rates (CPLR), and ceiling limits. PC biosolids contain the constituents identified above at concentrations below the monthly average specified in Part IV.A.2. CPLR biosolids contain the constituents identified above at concentrations above the monthly average and each sample must be below the ceiling limitations specified in Part IV.A.2.
- (2) All limits and criteria are expressed on a dry weight basis.
- (3) Monthly average shall be reported as the average of the results of all samples collected within a calendar month and analyzed using an approved method, in accordance with Part II.A.1-2 of the permit. For monitoring periods which include multiple months, if one sample is collected during the monitoring period, that result shall be reported as the monthly average. If samples are collected in multiple months during the monitoring period, a monthly average shall be calculated for each month in which samples were collected during the monitoring period and the highest monthly average reported. Individual results and calculations shall be submitted with the report.
- (4) The maximum concentration shall be reported as the highest single result from all samples collected and analyzed during a monitoring period.
- (5) The monitoring frequency may be increased during this permit term if DEQ deems it necessary.
- (6) The monthly average concentration for molybdenum is currently under study by USEPA. Research suggests that a monthly average molybdenum concentration below 40 mg/kg may be appropriate to reduce the risk of copper deficiency in grazing animals.

Bases for Limitations

1. VPDES Permit Regulation (9VAC25-31)

## Fact Sheet – VPDES Permit No. VA0090263 – Broadway Regional WWTF

### Pathogen Reduction Requirements

BASIS FOR LIMITS	PATHOGEN REDUCTION ALTERNATIVE	PROCESS TO SIGNIFICANTLY REDUCE PATHOGENS (PSRP) OPTION	CLASS B PATHOGEN REDUCTION TREATMENT STANDARDS	MONITORING REQUIREMENTS <sup>(1)</sup>
1,2	1	NA	Fecal coliform monitoring: <2,000,000 MPN/gm or <2,000,000 CFU/gm, geometric mean of 7 samples (9VAC25-32-675.B.2)	1/3 Months <sup>(2)</sup>
1,2	2	1	PSRP: Aerobic Digestion: Sludge mean cell residence time from 40 days at 20°C to 60 days at 15°C (9VAC25-32-675.D.1)	(3)
1,2	2	2	PSRP: Air dry in a drying bed for three months. Ambient average daily temperature must be above 0°C for 2 of the 3 months (9VAC25-32-675.D.2)	(3)
1,2	2	3	PSRP: Anaerobic digestion for a mean cell residence time between 15 days at 35°C - 55°C up to 60 days at 20°C (9VAC25-32-675.D.3)	(3)
1,2	2	4	PSRP: Composting at 40°C or above for 5 or more days, maintaining > 55°C for 4 consecutive hours during the 5 days (9VAC25-32-675.D.4)	(3)
1,2	2	5	PSRP: Sufficient lime is added to the sewage sludge to raise the pH of the sewage sludge to 12 after two hours of contact (9VAC25-32-675.D.5)	(3)
1,2	3	PROCESS AS APPROVED	Process equivalent to PSRP: PROCESS AS APPROVED (9VAC25-32-675 B.4.)	(3)

NA = Not applicable

1/3 Months = Sampling each calendar quarter with the results submitted by February 19<sup>th</sup> of each year

- (1) The monitoring frequency may be increased during this permit term if DEQ deems it necessary.
- (2) Between sampling events, operating records must demonstrate that the treatment facility is operating at a performance level known to meet pathogen reduction standards.
- (3) Process monitoring must be sufficient to demonstrate compliance with PSRP treatment requirements.

#### Bases for Requirements

1. VPDES Permit Regulation (9VAC25-31-710)
2. Environmental Regulations and Technology - Control of Pathogens and Vector Attraction Reduction in Sewage Sludge (EPA/625/R-92/013)

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### Vector Attraction Reduction (VAR) Requirements

BASIS FOR LIMITS	VAR OPTION	VAR TREATMENT STANDARD	MONITORING REQUIREMENTS <sup>(1)</sup>
1,2	1	38% Reduction of volatile solids by digestion (9VAC25-32-685.B.1)	1/3 Months <sup>(2)(3)</sup>
1,2	2	When 38% reduction is not achieved by anaerobic digestion, 40 day bench study at temperatures between 30°C and 37°C to demonstrate further reduction of volatile solids <17% (9VAC25-32-685.B.2)	1/3 Months <sup>(2)(3)</sup>
1,2	3	When 38% reduction is not achieved by aerobic digestion, 30 day bench study at 20°C to demonstrate further reduction of volatile solids <15% (9VAC25-32-685.B.3)	1/3 Months <sup>(2)(3)</sup>
1,2	4	Specific Oxygen Uptake Rate of ≤ 1.5 mg O <sub>2</sub> /hour/gram total solids at 20°C (aerobically processes sludge) (9VAC25-32-685.B.4)	1/3 Months <sup>(2)(3)</sup>
1,2	5	14 day aerobic process, temperatures above 40°C with an average temperature of >45°C (9VAC25-32-685.B.5)	(3)
1,2	6	Sufficient alkali is added to the sewage sludge to raise the pH of the sewage sludge to 12 S.U. or higher, and without the addition of more alkali, maintain the pH at 12 S.U. for two hours and then at 11.5 S.U. or higher for an additional 22 hours (9VAC25-32-685.B.6)	(3)
1,2	7	Where biosolids do not contain unstabilized solids from primary wastewater treatment, the percent solids of the biosolids shall be ≥ 75% (9VAC25-32-685.B.7)	1/3 Months <sup>(2)(3)</sup>
1,2	8	Where biosolids contain unstabilized solids from primary wastewater treatment, the percent solids of the biosolids shall be ≥ 90% (9VAC25-32-685.B.8)	1/3 Months <sup>(2)(3)</sup>
1,2	9	Sewage Sludge shall be injected below the surface of the land (9VAC25-32-685.B.9)	NA <sup>(4)</sup>
1,2	10	Sewage sludge land applied shall be incorporated into the soil within 6 hours after application (9VAC25-32-685.B.10)	NA <sup>(4)</sup>

NA = Not applicable

1/3 Months = Sampling each calendar quarter with the results submitted by February 19<sup>th</sup> of each year

- (1) The monitoring frequency may be increased during this permit term if DEQ deems it necessary.
- (2) Between sampling events, operating records must demonstrate that the treatment facility is operating at a performance level known to meet VAR standards.
- (3) Process monitoring must be sufficient to demonstrate compliance with VAR treatment requirements.
- (4) If the selected VAR option 1- 8 is not met, the permittee shall provide notification to the land applier at the time the biosolids are delivered that the biosolids did not meet VAR at the treatment facility and that the biosolids must be injected or incorporated. The permittee shall obtain verification from the land applier that injection or incorporation occurred.

#### Bases for Requirements

1. VPDES Permit Regulation (9VAC25-31-720)
2. Environmental Regulations and Technology - Control of Pathogens and Vector Attraction Reduction in Sewage Sludge (EPA/625/R-92/013)

APPENDIX D

BASES FOR PERMIT SPECIAL CONDITIONS

Tabulated below are the sections of the permit, with any changes and the reasons for the changes identified. Also provided is the basis for each of the permit special conditions.

Cover Page	<ul style="list-style-type: none"><li>• Content and format as prescribed by the VPDES Permit Manual.</li><li>• Facility name changed from Town of Broadway Regional WWTF to Broadway Regional WWTF</li></ul>
Part I.A.1	<p><b>Effluent Limitations and Monitoring Requirements – Outfall 003:</b> Bases for effluent limits provided in previous pages of this fact sheet. Monitoring requirements prescribed by VPDES Permit Manual. <i>Updates Part I.A.3 of the previous permit with the following:</i></p> <ul style="list-style-type: none"><li>• Changes were made to the format and introductory language.</li><li>• Oil &amp; Grease monitoring was removed from the permit.</li><li>• Less stringent Ammonia-N limits were included.</li><li>• Monitoring for CBOD<sub>5</sub> and Ammonia-N (Jan-May) was changed from 1/Day to 5/Week.</li><li>• The acute WET limit was changed from TUa to an equivalent percentage and applied to <i>C.d.</i></li><li>• The chronic WET limit was applied to both <i>C.d.</i> and <i>P.p.</i></li><li>• Nitrate plus Nitrite, TKN, TN, and TP monitoring were removed since they are reported under the permittee's VPDES GP coverage (VAN010062).</li><li>• More stringent limits for Total Phosphorus and Total Nitrogen were included.</li></ul>
Part I.B	<p><b>TRC And E. coli Limitations and Monitoring Requirements:</b> <i>Updates Part I.C of the previous permit.</i> Required by Sewage Collection and Treatment (SCAT) Regulations and 9VAC25-260-170, Bacteria; other waters. Also, 40 CFR 122.41(e) requires the permittee, at all times, to properly operate and maintain all facilities and systems of treatment in order to comply with the permit. This ensures proper operation of chlorination equipment to maintain adequate disinfection.</p>
Part I.C	<p><b>Effluent Limitations and Monitoring Requirements – Additional Instructions:</b> <i>Updates Part I.D of the previous permit.</i> Authorized by VPDES Permit Regulation, 9VAC25-31-190.J.4 and 220.I. This condition is necessary when a maximum level of quantification and/or a specific analytical method is required in order to assess compliance with a permit limit or to compare effluent quality with a numeric criterion. The condition also establishes protocols for calculation of reported values. Nutrient reporting calculations were updated. §62.1 44.19:13 of the Code of Virginia defines how annual nutrient loads are to be calculated; this is carried forward in 9VAC25-820-70. As annual concentrations are limited in the individual permit, this special condition is intended to reconcile the reporting calculations between the permit programs, as the permittee is collecting a single set of samples for the purpose of ascertaining compliance with two permits.</p>
Part I.D	<p><b>Pretreatment Program Requirements:</b> <i>Updates Part I.E of the previous permit.</i> VPDES Permit Regulation, 9VAC25-31-730 through 900, and 40 CFR part 403 require certain existing and new sources of pollution to meet specified regulations.</p>
Part I.E	<p><b>Whole Effluent Toxicity (WET) Requirements:</b> <i>Updates Part I.F of the previous permit.</i> VPDES Permit Regulation, 9VAC25-31-210 and 220.I, requires monitoring in the permit to provide for and assure compliance with all applicable requirements of the State Water Control Law and the Clean Water Act.</p>
Part I.F.1	<p><b>95% Capacity Reopener:</b> <i>Updates Part I.G.1 of the previous permit.</i> Required by VPDES Permit Regulation, 9VAC 25-31-200.B.4 for certain permits.</p>
Part I.F.2	<p><b>Indirect Dischargers:</b> <i>Identical to Part I.G.2 of the previous permit.</i> Required by VPDES Permit Regulation, 9VAC25-31-200.B.1 for all STPs that receive waste from someone other than the owner of the treatment works.</p>

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- Part I.F.3 **Materials Handling/Storage:** *Updates Part I.G.3 of the previous permit.* 9VAC25-31-280.B.2 requires that the types and quantities of “wastes, fluids, or pollutants which are ... treated, stored, etc.” be addressed for all permitted facilities.
- Part I.F.4 **O&M Manual Requirement:** *Updates Part I.G.4 of the previous permit.* Required by Code of Virginia 62.1-44.19, SCAT Regulations 9VAC25-790, and VPDES Permit Regulation 9VAC25-31-190 E for all STPs.
- Part I.F.5 **CTC/CTO Requirement:** *Identical to Part I.G.5 of the previous permit.* Required by Code of Virginia 62.1-44.19, SCAT Regulations 9VAC25-790, and VPDES Permit Regulation 9VAC25-31-190.E for all STPs.
- Part I.F.6 **SMP Requirement:** *Updates Part I.G.6 of the previous permit.* VPDES Permit Regulation 9VAC25-31-100.P, 220.B.2, and 420 through 720, and 40 CFR Part 503 require all treatment works treating domestic sewage to submit information on their sludge use and disposal practices and to meet specified standards for sludge use and disposal. Technical requirements are derived from the Virginia Pollution Abatement Permit Regulation (9VAC25-32-10 *et seq.*)
- Part I.F.7 **Licensed Operator Requirement:** *Updates Part I.G.7 of the previous permit.* The VPDES Permit Regulation 9VA 25-31-200 C, the Code of Virginia 54.1-2300 *et seq.*, and Rules and Regulations for Waterworks and Wastewater Works Operators 18VAC160-20-10 *et seq.*, require licensure of operators.
- Part I.F.8 **Reliability Class:** *Identical to Part I.G.8 of the previous permit.* Required by SCAT Regulations 9VAC25-790.
- Part I.F.9 **Water Quality Criteria Monitoring:** *Updates Part I.G.9 of the previous permit.* State Water Control Law at 62.1-44.21 authorizes the Board to request information needed to determine the discharge’s impact on State waters. States are required to review data on discharges to identify actual or potential toxicity problems, or the attainment of water quality goals, according to 40 CFR Part 131, Water Quality Standards, Subpart 131.11. To ensure that water quality criteria are maintained, the permittee is required to analyze the facility’s effluent for the substances noted in Attachment A of this VPDES permit.
- Part I.F.10 **Treatment Works Closure Plan:** *Updates Part I.G.10 of the previous permit.* Required for all STPs per the State Water Control Law at 62.1-44.18.C and 62.1-44.15:1.1, and the SCAT Regulations at 9VAC25-790-450.E and 9VAC25-790-120.E.3.
- Part I.F.11 **Reopeners:**  
a. *Identical to Part I.G.11.a of the previous permit:* Section 303(d) of the Clean Water Act requires that total maximum daily loads (TMDLs) be developed for streams listed as impaired. This special condition is to allow the permit to be reopened if necessary to bring it into compliance with any applicable TMDL approved for the receiving stream. The reopener recognizes that, according to section 402(o)(1) of the Clean Water Act, limits and/or conditions may be either more or less stringent than those contained in this permit. Specifically, they can be relaxed if they are the result of a TMDL, basin plan, or other wasteload allocation prepared under section 303 of the Act.  
b. *Identical to Part I.G.11.b of the previous permit:* 9VAC25-40-70 A authorizes DEQ to include technology-based annual concentration limits in the permits of facilities that have installed nutrient control equipment, whether by new construction, expansion or upgrade.  
c. *Identical to Part I.G.11.c of the previous permit:* 9VAC25-31-390 A authorizes DEQ to modify VPDES permits to promulgate amended water quality standards.



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- Part I.F.12 **Suspension of concentration limits for E3/E4 facilities:** *Identical to Part I.G.13 of the previous permit.* 9VAC25-40-70.B authorizes DEQ to approve an alternate compliance method to the technology-based effluent concentration limitations as required by subsection A of this section. Such alternate compliance method shall be incorporated into the permit of an Exemplary Environmental Enterprise (E3) facility or an Extraordinary Environmental Enterprise (E4) facility to allow the suspension of applicable technology-based effluent concentration limitations during the period the E3 or E4 facility has a fully implemented environmental management system that includes operation of installed nutrient removal technologies at the treatment efficiency levels for which they were designed.
- Part I.F.13 **Notification Levels:** *Identical to Part I.G.14 of the previous permit.* Required by the VPDES Permit Regulation 9VAC25-31-200.A for all manufacturing, commercial, mining, and silvicultural dischargers. Although this permit is for a POTW and not an industrial user, a majority of its flow is from two industrial users. The condition has been carried forward.
- Part I.F.14 **Low Flow Augmentation Plan:** *Identical to Part I.G.18 of the previous permit.* This special condition was included at permit issuance to address comments received from DGIF and the Town of New Market. According to the approved plan, the permittee must discharge effluent to the stream during periods when stream flows drop to a target level of 15.61 cfs at the Cootes Store Gage. Per DGIF, this plan will ensure that the loss of stream flow due to irrigation does not have an adverse impact on the North Fork Shenandoah River. Minimum in-stream flow and release requirements are based on Section 61.1-44.36. of the State Water Control Law.
- Part II **Conditions Applicable to All VPDES Permits:** *Updates Part II of previous permit.* VPDES Permit Regulation 9VAC25-31-190 requires all VPDES permits to contain or specifically cite the conditions listed.
- Part III.A.1 **Municipal Wastewater Limitations and Monitoring Requirements:** Bases for limits and monitoring requirements provided in Appendix C of this fact sheet.  
*Updates Part I.A.4 of the previous permit with the following:*
- Changes were made to the format and introductory language.
  - Total Volume requirements were replaced with Total Volume Land Applied.
  - A less stringent maximum pH limit was included.
  - Phosphorus requirements were replaced with Total Phosphorus requirements.
  - Requirements for monitoring and reporting PAN Applied to Each Field and P<sub>2</sub>O<sub>5</sub> Applied to Each Field were included.
  - The monitoring frequency for BOD<sub>5</sub>, Chlorides, TKN, Ammonia-N, Nitrate –N, PAN, Total Phosphorus, P<sub>2</sub>O<sub>5</sub> were reduced from 1/Week to 1/Month.
  - Requirements for monitoring and reporting Total Suspended Solids, Sulfate, Potassium, Potassium as K<sub>2</sub>O, TOC, COD, Organic Nitrogen, Conductivity, Oil & Grease, Total Sodium, Total Calcium, Total Magnesium, Total Copper, Total Zinc, Total Nickel, Total Cadmium, Total Lead, Total Mercury, Total Molybdenum, Total Arsenic, Total Selenium, and Total Boron were removed.
  - Reporting units for PAN and P<sub>2</sub>O<sub>5</sub> were revised.
  - The footnotes were revised to reflect the changes mentioned above and also to reflect format changes in the special conditions pages of the permit.

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Part III.A.2 **Soil Limitations and Monitoring Requirements:** Bases for soil limitations and monitoring requirements are provided in Appendix C of this fact sheet.

*Updates previous Part I.A.5 of the previous permit with the following:*

- Changes were made to the format and introductory language.
- Requirements for monitoring and reporting Soil Organic Matter, Total Nitrogen, Organic Nitrogen, Nitrate Nitrogen, Soluble Salt, Total Copper, Total Nickel, Total Zinc, Total Cadmium, Total Lead, Total Mercury, Total Molybdenum, Total Arsenic, and Total Selenium were removed.
- Footnotes in regards to when samples shall be collected and separate analyses on the surface and most limiting subsoil horizons were removed.
- The footnotes were revised to reflect the changes mentioned above and also to reflect format changes in the special conditions pages of the permit.

Part III.A.3 **Ground Water Limitations and Monitoring Requirements:** Bases for ground water limitations and monitoring requirements are provided in Appendix C of this fact sheet.

*Updates previous Part I.A.6 of the previous permit with the following:*

- Changes were made to the format and introductory language.
- The monitoring frequency for Static Water Level, pH, TOC, Chlorides, Total Dissolved Solids, Nitrate-N, and Conductivity were reduced from 2/Year to 1/Year.
- Requirements for monitoring and reporting Ammonia-N, Sulfate, COD, Total Coliform, Total Dissolved Copper, Total Dissolved Nickel, Total Dissolved Zinc, Total Dissolved Cadmium, Total Dissolved Lead, Total Dissolved Mercury, Total Dissolved Molybdenum, Total Dissolved Arsenic, and Total Dissolved Selenium were removed.
- The footnote regarding to where samples shall be taken was revised to reference the GMWP.
- Footnotes were revised to reflect the changes mentioned above and also to reflect format changes in the special conditions pages of the permit.

### Part III.B **Other Requirements and Special Conditions**

#### General Special Conditions for all VPA Permits required per VPA Permit Manual

Part III.B.1 Storm Water Discharge Exception Special Condition (SC) is identical to previous Part I.H.1.

Part III.B.2 Threatened and Endangered Species Protection is a new requirement.

#### Special Conditions for Municipal Wastewater Land Application required per VPA Permit Manual

Part III.B.3 Site Identification SC updates previous Part I.H.3.

Part III.B.4 Monthly Report SC updates previous Part I.H.4.

Part III.B.5 Annual Report SC updates previous Part I.H.5.

Part III.B.6 NMP SC updates previous Part I.H.13., Part I.H.14., and Part I.H.15.

Part III.B.8 Irrigation Schedule SC updates previous Part I.H.6. and Part I.H.13.

Part III.B.10 GWMP SC updates previous Part I.G.16.

Part III.B.11 Inclement Weather SC updates previous Part I.H.7.

Part III.B.13 Wind Restriction SC is a new requirement.

Part III.B.17 Hay Harvesting SC identical to previous Part I.H.16.

#### Special Conditions based on VPDES Permit Manual and included in this permit per BPJ

Part III.B.18 Soil pH SC updates previous Part I.H.19.

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### Special Conditions based on the VPA Permit Regulation for Biosolids and included per BPJ

Part III.B.20 Buffer/Setbacks SC updates previous Part I.H.17.

### Special Conditions based on Guidance Memorandum # 01-2005 - Spray Irrigation and Reuse of Wastewater and included per BPJ

Part I.B.7 Soil Moisture Monitoring Plan SC updates previous Part I.H.8-11.

Part III.B.12 Timing and Temperature Restrictions SC updates previous Part I.H.12.

Part III.B.14 Rate Adjustment SC updates previous Part I.H.6.

### Special Conditions based on VPA Technical Guide and included in this permit per BPJ

Part III.B.9 Cation Imbalance Plan SC updates previous Part I.H.20.

### Special Conditions based on Technical Committee recommendations and included in this permit per BPJ

Part III.B.15 End Gun SC is identical to previous Part I.H.21.

Part III.B.16 Field Rut Remediation Plan SC is identical to previous Part I.H.22.

Part III.B.19 Soil Conservation Plans SC updates previous Part I.H.18.

- Part IV.A.1 **Annual Production Monitoring:** *New requirement.* 9VAC25-31.220.I.4 specifies that each permit shall include monitoring requirements for sewage sludge to assure compliance with permit limits.
- Part IV.A.2 **Metals Limitations & Monitoring:** *New requirement.* Bases for limits and monitoring requirements provided in Appendix C of this fact sheet.
- Part IV.A.3 **Pathogen Reduction Requirements:** *New Requirement.* Bases for requirements provided in Appendix C of this fact sheet.
- Part IV.A.4 **VAR Requirements:** *New Requirement.* Bases for requirements provided in Appendix C of this fact sheet.
- Part IV.B.1 **Approved Sources of Biosolids:** *New Requirement.* 9VAC25-32-440.D states, “No person shall land apply, market, or distribute biosolids in Virginia unless the biosolids source has been approved by the board.” 9VAC25-32-510.B and C require sewage sludge to be treated to meet biosolids standards prior to delivery to the land application site.
- Part IV.B.2 **Annual Report:** *New Requirement.* 9VAC25-31-590.A requires the submittal of an annual report postmarked by February 19 for the previous year. 9VAC25-31-220.I.3. provides for the VPDES permit to require monitoring the volume of biosolids and other measurements as appropriate. 9VAC25-31-590.C requires reports be maintained verifying that sludge treatment for pathogen and vector attraction reduction be maintained by the generator and owner (of the permit). 9VAC25-31-190.H. requires the permittee to submit information requested by the board, within a reasonable time, to determine compliance with the permit. Other specific information and maintenance requirements are identified in 9VAC25-20-147.A.
- Part IV.B.3 **Recordkeeping:** *Updates Part I.F.5 of the previous permit.* 9VAC25-31-580 outlines record keeping requirements for biosolids. 9VAC25-31-190.J requires all records pertaining to biosolids to be maintained for 5 years, including monitoring information, copies of all reports required by the permit and data used to develop the permit application.
- Part IV.B.4 **Generator NANI:** *New Requirement.* 9VAC25-31-530.F requires the generator of biosolids who provides biosolids to a land applier, to give notice and necessary information to the land applier.  
9VAC25-31-480 states that the preparer of biosolids shall ensure that the applicable

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requirements in 9VAC25-31 Part VI are met when biosolids are land applied. 9VAC25-31-530.F requires that when the preparer of biosolids gives his biosolids to another person who prepares biosolids, the person who provides the biosolids give the person who receives the biosolids notice and necessary information to comply with 9VAC25-31 Part VI.

Part IV.B.5

**Biosolids Management Plan (BSMP):** *Updates Part I.F.5 of the previous permit.* 9VAC25-31-485.G requires the permit holder to maintain and implement a BSMP and specifies its components. In addition to all materials submitted with permit application, which includes an Odor Control Plan (OCP), a Nutrient Management Plan (NMP) and O&M Manual are required. 9VAC25-31-485.G.3, 9VAC25-790-140 and 9VAC25-790-260 – 300 identify minimum requirements to be included in an O&M Manual. Additional requirements are included in 9VAC25-31-100.Q.12. 9VAC25-31-100.Q.6 requires Generator's OCP and minimum content.

Part IV.B.6.

**Reopener:** *Identical to Part I.F.12.d of the previous permit.* 9VAC25-31-220.C requires inclusion of a reopener clause in the permit to authorize immediate modification of the permit to address changes to standards or requirements for the use or disposal of biosolids, industrial wastewater sludge, or septage.

### DELETIONS

Tabulated below are the sections of the previous permit that were deleted and the basis for this action.

Part I.A.1

**Effluent Limitations and Monitoring Requirements – 1.923 MGD Flow Tier (Outfall 002):** These requirements are no longer applicable since the facility no longer discharges from the outfall.

Part I.A.2

**Effluent Limitations and Monitoring Requirements – 2.923 MGD Flow Tier (Outfall 002):** These requirements are no longer applicable since the facility no longer discharges from the outfall.

Part I.B

**Additional Disinfection Limitations and Monitoring Requirements – 1.923 MGD Flow Tier (Outfall 002):** These requirements are no longer applicable since the facility no longer discharges from the outfall.

Parts I.G.12

**Offset Requirement:** This requirement no longer applies since the concentration limits for nutrients will ensure the load allocations are met.

Parts I.G.15

**Stream Monitoring:** These requirements are no longer applicable since the facility no longer discharges from outfall 002.

Part I.G.17

**Specification of Source of Discharge:** These requirements are no longer applicable since the facility no longer discharges from Outfall 002.

Part I.G.19

**Storm Water Management:** The requirement is no longer applicable since the facility has obtained storm water coverage under the general permit.

Part I.G.20

**Connection of New Market:** These requirements are no longer applicable since the facility has been expanded and New Market has connected.